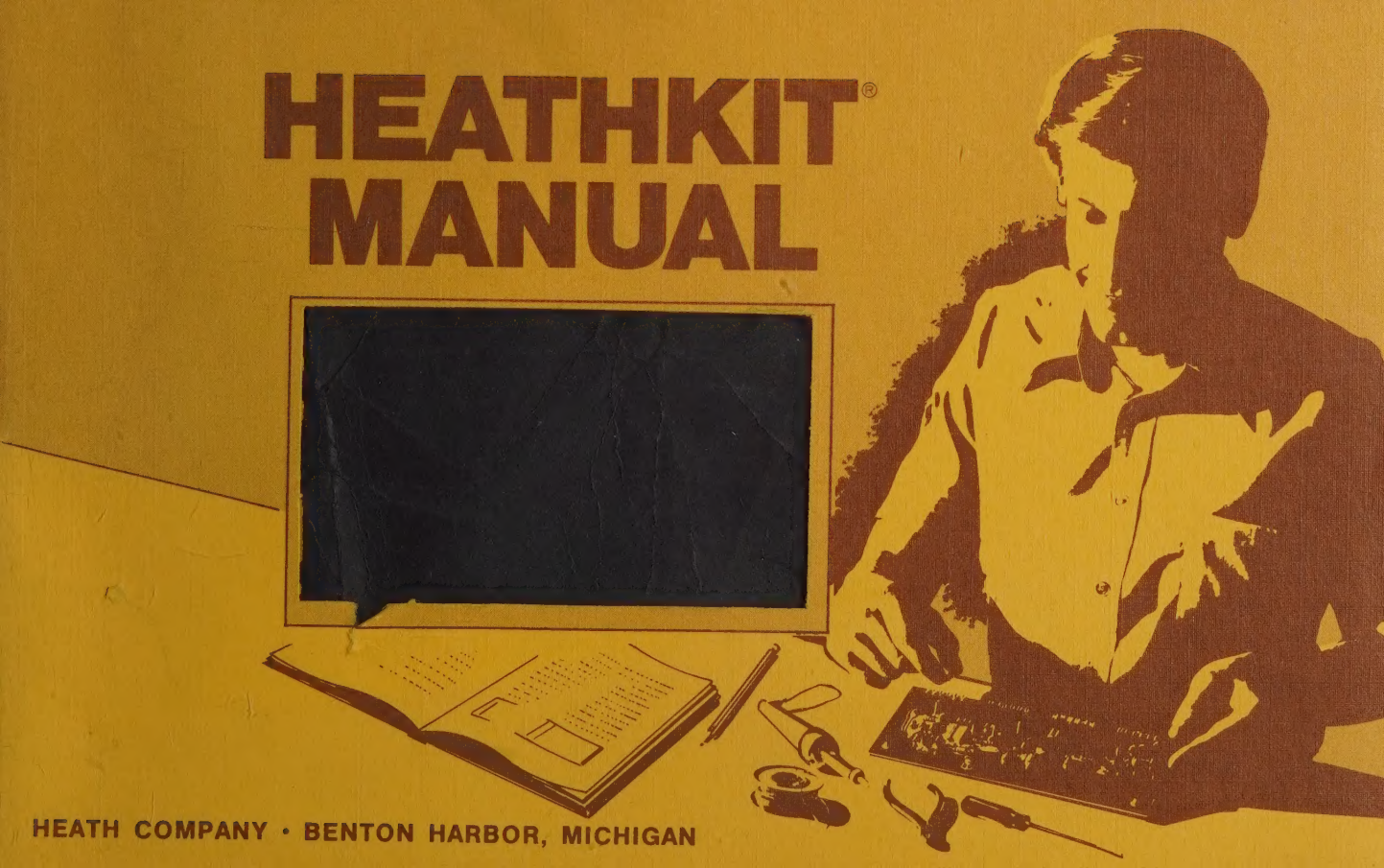
HEATHKIT® MANUAL



HEATH COMPANY • BENTON HARBOR, MICHIGAN

YOUR HEATHKIT 90 DAY LIMITED WARRANTY

If you are not satisfied with our service - warranty or otherwise - or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney, who happens to be quite a kitbuilder himself, insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are:

For a period of ninety (90) days after purchase, Heath Company will replace or repair free of charge any parts that are defective either in materials or workmanship. You can obtain parts directly from Heath Company by writing us at the address below or by telephoning us at (616) 982-3571. And we'll pay shipping charges to get those parts to you — anywhere in the world.

We warrant that during the first ninety (90) days after purchase, our products, when correctly assembled, calibrated, adjusted and used in accordance with our printed instructions, will meet published specifications.

If a defective part or error in design has caused your Heathkit product to malfunction during the warranty period through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, any Heathkit Electronic Center (units of Schlumberger Products Corporation), or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the assembly or use of your Heathkit product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by the use of corrosive solder, defective tools, incorrect assembly, misuse, fire, or by unauthorized modifications to or uses of our products for purposes other than as advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heathkit products and is not extended to allied equipment or components used in conjunction with our products. **We are not responsible for incidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
BENTON HARBOR, MI. 49022

HEATH COMPANY PHONE DIRECTORY

The following telephone numbers are direct lines to the departments listed:

Kit orders and delivery information	(616) 982-3411
Credit	(616) 982-3561
Replacement Parts	(616) 982-3571
Technical Assistance Phone Numbers	
8:00 A.M. to 12 P.M. and 1:00 P.M. to 4:30 P.M., EST, Weekdays Only	
R/C, Audio, and Electronic Organs	(616) 982-3310
Amateur Radio	(616) 982-3296
Test Equipment, Weather Instruments and Home Clocks	(616) 982-3315
Television	(616) 982-3307
Aircraft, Marine, Security, Scanners, Automotive, Appliances and General Products	(616) 982-3496
Computers	(616) 982-3309

Prices and specifications subject to change without notice.

Heathkit® Manual

for the

8-CHANNEL MODULAR R/C RECEIVER

Model GDA-1205-2

595-1729-03

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HEATH COMPANY
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INTRODUCTION

The Heathkit 8-Channel Modular R/C Receiver, Model GDA-1205-2, features separate RF modules which allow you to operate on any of the 17 available R/C channels without buying complete receiver and transmitter systems. Quick changes in the field permit you to operate at almost any time, without the usual tiresome wait for a clear channel. The quick-change, plug-in, RF Modules come in all of the following frequencies, permitting you to change to a new band, or to an unused channel, in just a few seconds.

27 MHz Band	53 MHz Band	72 MHz Band
26.995 MHz	53.100 MHz	72.080 MHz
27.045 MHz	53.200 MHz	72.160 MHz
27.095 MHz	53.300 MHz	72.240 MHz
27.145 MHz	53.400 MHz	72.320 MHz
27.195 MHz	53.500 MHz	72.400 MHz
		72.960 MHz
		75.640 MHz

A total of eight transistors, one integrated circuit (low-current drain MOS IC decoder), and three ceramic IF filters are used in the Receiver. All parts are mounted on two glass epoxy circuit boards: the receiver module circuit board and the RF module circuit board. The outputs for the eight channels are supplied to the individual servos by a space-saving connector block located inside the receiver case.

Supply voltage for the Receiver and servos is supplied by a compact, rectangular, 4.8-volt, nickel-cadmium, rechargeable battery pack, Heathkit Model GDA-1205-3. The completed Receiver and RF modules are housed in two small, attractive, molded nylon cases which occupy only 2.7 cubic inches of space. You can charge the Receiver battery without disconnecting it from the Receiver. The three ceramic IF filters assure you of trouble-free temperature stability without the need for adjustments.

The 8-channel R/C Modular Receiver was designed for use with the 5-channel transmitters GDA-505-D and GDA-505-S and 8-channel transmitters GDA-1205-D and GDA-1205-S. One RF module is supplied with 5-channel systems, and two with 8-channel systems.

IMPORTANT NOTE: If you have purchased either the GD-1205 or the GD-505 complete systems, assemble them in the following order:

1. Transmitter.
2. Receiver Battery.
3. Receiver.
4. Receiver RF Modules.
5. Servos.

Federal Communications Commission requirements prescribe maximum RF radiation from receivers operating above 30 MHz. This receiver will meet these requirements when constructed in strict accordance with the instructions in this Manual, using only components and materials supplied with the kit or the exact equivalent thereof. You will be instructed to sign and affix a label to the receiver certifying that you have constructed this receiver in accordance with the above mentioned instructions. In order to meet legal requirements, be certain to follow the instructions exactly as they are stated in this Manual.

PARTS LIST

Check each part against the following list. Make a check (✓) in the space provided as you identify each part. Any part that is packed in an individual envelope with the part number on it should be placed back into the envelop after you identify it until it is called for in a step. Do not discard any packing materials until all parts are accounted for.

Each circuit part in this kit has its own "Circuit Component Number" (R1, C11, D21, etc.). This is a specific number for only that one part. The purpose of these numbers is to help you easily identify the same part in each section of the Manual. These numbers will appear:

- In the Parts List.
- At the beginning of each step where a component is installed.
- In some illustrations.
- In the sections at the rear of the Manual.

To order a replacement part: Always include the PART NUMBER. Use the Parts Order Form furnished with the kit. If one is not available, see "Replacement Parts" inside the rear cover of the Manual. For prices, refer to the separate "Heath Parts Price List." Your Warranty is located inside the front cover.

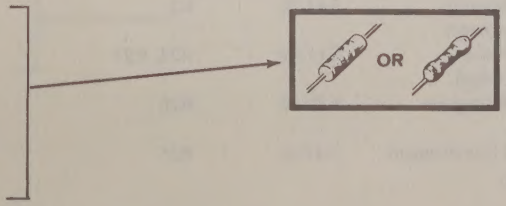
	QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.

RESISTORS, 1/4-Watt

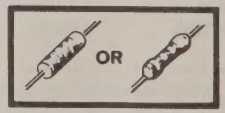
NOTES:

1. A silver fourth color band indicates 10% tolerance; a gold fourth band indicates 5% tolerance.
2. The resistors may be packed in more than one envelope. Open all the resistor envelopes in this pack before you check them against the Parts List.

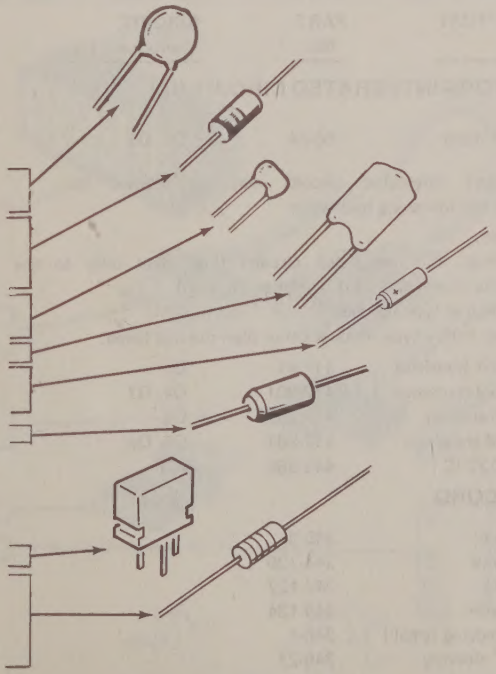
( )	1	10 Ω, 5% (brown-black-black)	1-55-12	R32
( )	1	100 Ω (brown-black-brown)	1-1-12	R3
( )	1	150 Ω (brown-green-brown)	1-37-12	R11
( )	1	820 Ω (gray-red-brown)	1-24-12	R5



	QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
Resistors (cont'd.)				
( )	3	1000 Ω (brown-black-red)	1-2-12	R12, R19, R29
( )	3	2200 Ω (red-red-red)	1-4-12	R14, R15, R16
( )	2	2700 Ω (red-violet-red)	1-5-12	R2, R13
( )	1	5600 Ω (green-blue-red)	1-26-12	R4
( )	2	6800 Ω (blue-gray-red)	1-27-12	R6, R9
( )	3	10 kΩ (brown-black-orange)	1-9-12	R17, R22, R28
( )	2	15 kΩ (brown-green-orange)	1-10-12	R18, Test
( )	2	18 kΩ (brown-gray-orange)	1-52-12	R8, R21
( )	1	22 kΩ (red-red-orange)	1-45-12	R24
( )	1	27 kΩ (red-violet-orange)	1-46-12	R23
( )	1	33 kΩ (orange-orange-orange)	1-41-12	R7
( )	2	47 kΩ (yellow-violet-orange)	1-11-12	R26, R27
( )	1	68 kΩ (blue-gray-orange)	1-31-12	R25
( )	1	150 kΩ (brown-green-yellow)	1-47-12	R31



	QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
CAPACITORS				
( )	2	.001 μF disc	21-140	C7, C19
( )	1	.005 μF disc	21-27	C16
( )	1	180 pF tubular (brown-gray-brown-white)	21-174	C14
( )	6	.047 μF (473) ceramic	21-182	C8, C9, C11, C13, C15, C18
( )	1	.047 μF Mylar*	27-129	C22
( )	2	1 μF tantalum	25-197	C12, C17
( )	1	2.2 μF tantalum	25-195	C23
( )	1	33 μF tantalum	25-211	C21
FILTER-RF CHOKES				
( )	3	Ceramic filter (SFB-455)	404-399	CF1, CF2, CF3
( )	1	2.2 μH choke (red-red-gold-silver)	45-73	L1
( )	2	1 mH choke (brown-black-red-silver)	45-80	L2, L3



*Registered Trademark, DuPont Corp.

QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.

DIODE-TRANSISTORS-INTEGRATED CIRCUIT (IC)

( )	2	1N4148 diode	56-84	D2, D3

NOTE: Transistors and integrated circuits may be marked for identification in any of the following four ways:

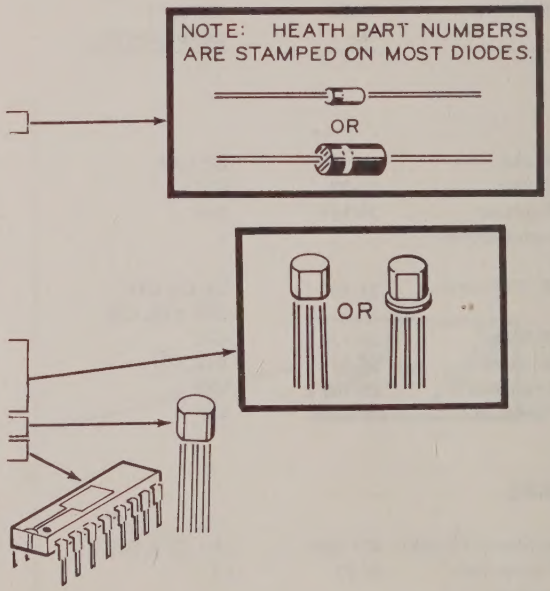
1. Part number.
2. Type number. (On integrated circuits this refers only to the numbers; the letters may be different or missing.)
3. Part number and type number.
4. Part number with a type number other than the one listed.

( )	1	2N5232A transistor	417-91	Q5
( )	2	X29A829 transistor	417-201	Q4, Q7
( )	1	TIS87 transistor	417-258	Q3
( )	2	MPSA20 transistor	417-801	Q6, Q8
( )	1	SCUS0127 IC	443-689	IC1

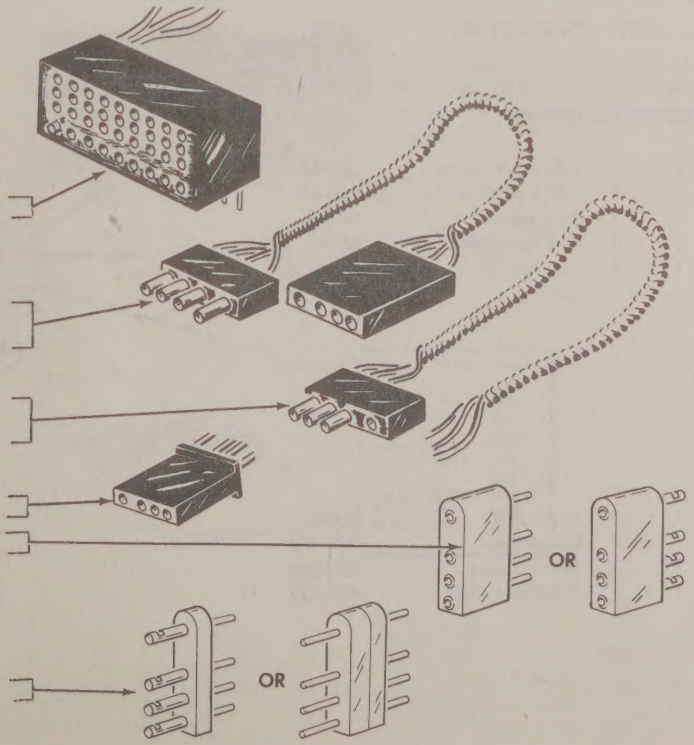
WIRE-SLEEVING-CORD

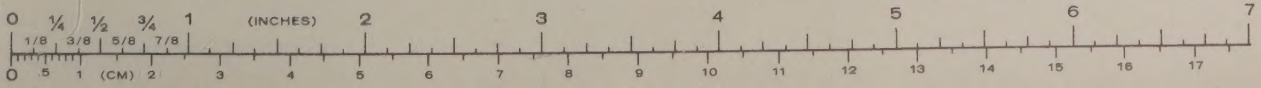
( )	12"	Bare wire	340-3
( )	7"	Black wire	344-125
( )	7"	Red wire	344-127
( )	43"	White wire	344-134
( )	7"	Black sleeving (small)	346-1
( )	7"	Teflon* sleeving	346-21
( )	1"	Heat-shrinkable sleeving (large)	346-35
( )	24"	Nylon cord	349-1

*Registered Trademark, DuPont Corp.

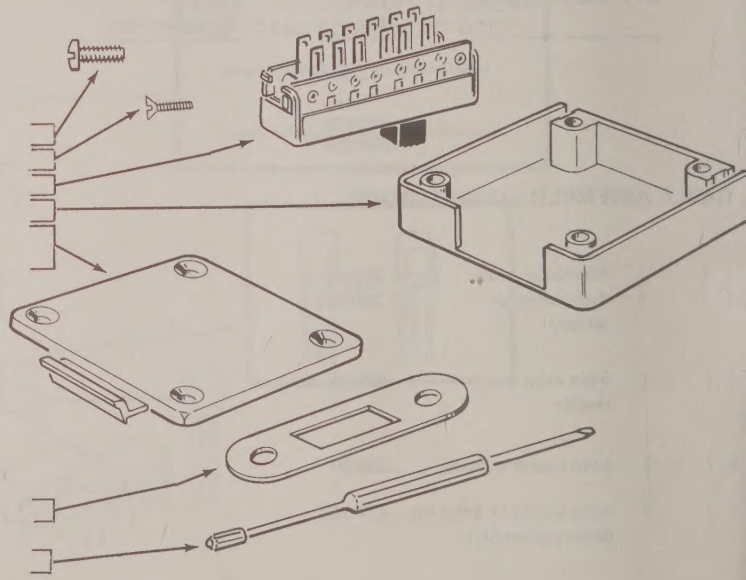


QTY.		DESCRIPTION	PART No.	CIRCUIT Component No.
		CABLE ASSEMBLIES-CONNECTORS		
( )	1	Connector block	238-31	
( )	1	4-pin cable assembly	238-34	
( )	1	3-pin cable assembly	238-35	
( )	2	4-pin socket w/leads	238-99	
( )	2	4-pin socket (1 extra for battery assembly)	432-103	
( )	1	4-pin plug	432-104	





	QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.
MISCELLANEOUS				
( )	2	3-48 x 1/4" screw	250-49	
( )	4	2-56 x 5/16" screw	250-422	
( )	1	Slide switch	60-35	
( )	1	Case top section	95-94	
( )	1	Case bottom section	95-95	
( )	1"	Foam tape	73-39	
( )	1	Switch plate	205-559	
( )	1	Circuit board	85-1598	
( )	1	Alignment tool	490-109	

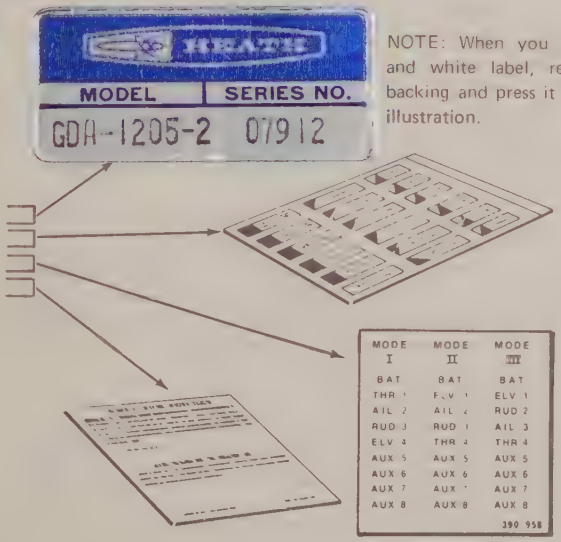


QTY.	DESCRIPTION	PART No.	CIRCUIT Component No.

PRINTED MATERIAL

NOTE: Be sure you refer to the numbers on the blue and white label in any communications you may have about this kit with Heath Company.

( )	1	Blue and white label	391-34
( )	1	Frequency label (set)	390-919
( )	1	Connector label (set)	390-958
( )	1	FCC label	390-1163
( )	1	Parts Order Form	597-260
( )	1	Assembly Manual (See front cover for part number.)	
( )		Solder	



NOTE: When you locate your blue and white label, remove the paper backing and press it in place over this illustration.

ASSEMBLY NOTES

The receiver circuit board, the RF module circuit boards, and all their components are quite small. Many of these components are easily broken; handle them with care.

It is of the utmost importance that you take your time to assemble this kit. Follow all instructions carefully. Do not attempt "shortcut" procedures. Cut and bend all leads as outlined at the beginning of the "Step-by-Step Assembly" on the following pages.

When you solder, use a small-wattage soldering iron, allow it to reach operating temperature, and then apply it only long enough to make a good solder connection.

We recommend that you use a soldering iron that is rated at 15 to 25 watts. Its tip should be no wider than 1/8"; a pyramid or chisel-shaped tip is best. This type of soldering iron will make the kit easier to assemble with less chance of solder bridges occurring between foils on the circuit boards.

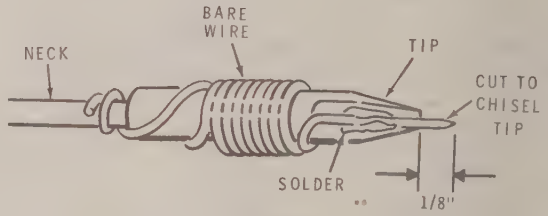


Figure 1

If a small wattage, small-tip soldering iron is not available, proceed as follows: Be sure your soldering iron is cool. Then wrap the heavy bare wire supplied with this kit tightly around the soldering tip as shown in Figure 1. Allow approximately 1/8" of wire to extend beyond the soldering iron tip. For good heat transfer, perform the following steps.

1. Tighten the wire around the neck of the soldering iron with a pair of pliers.
2. Melt some solder between the wire and the iron tip.
3. When you solder, keep the wire between the iron and the circuit board so the wire is pressed against the iron tip.

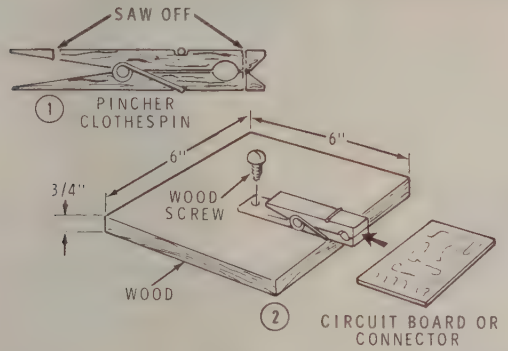
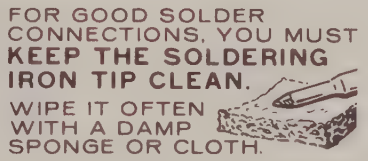


Figure 2

Because the circuit boards are small and have a tendency to move around while you solder them, it is a good idea to hold them in some manner. A simple jig made from a small board and a pincher clothes pin, as shown in Figure 2, works very well for this purpose. You can also use a small vise.

Because of the small surface area on the circuit boards, there is insufficient room to letter the value of each component. Therefore, all component locations, except for resistors, are shown on the boards with only a representative drawing for their locations. See Figure 3. Resistor outlines are filled in. Open circles, and other outlines are drawn to represent components as illustrated. Triangles represent locations where wires are to be installed. When you mount components, be sure they fit directly over their respective locations on the boards.

Resistors will be called out by their resistance values (in Ω or kΩ) and color code. Capacitors will be called out by their capacitance value and type.



SAFETY WARNING: Avoid eye injury when you cut off excess lead lengths. Hold the leads so they cannot fly toward your eyes.

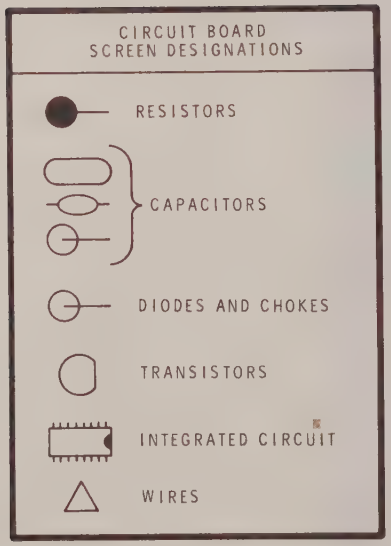
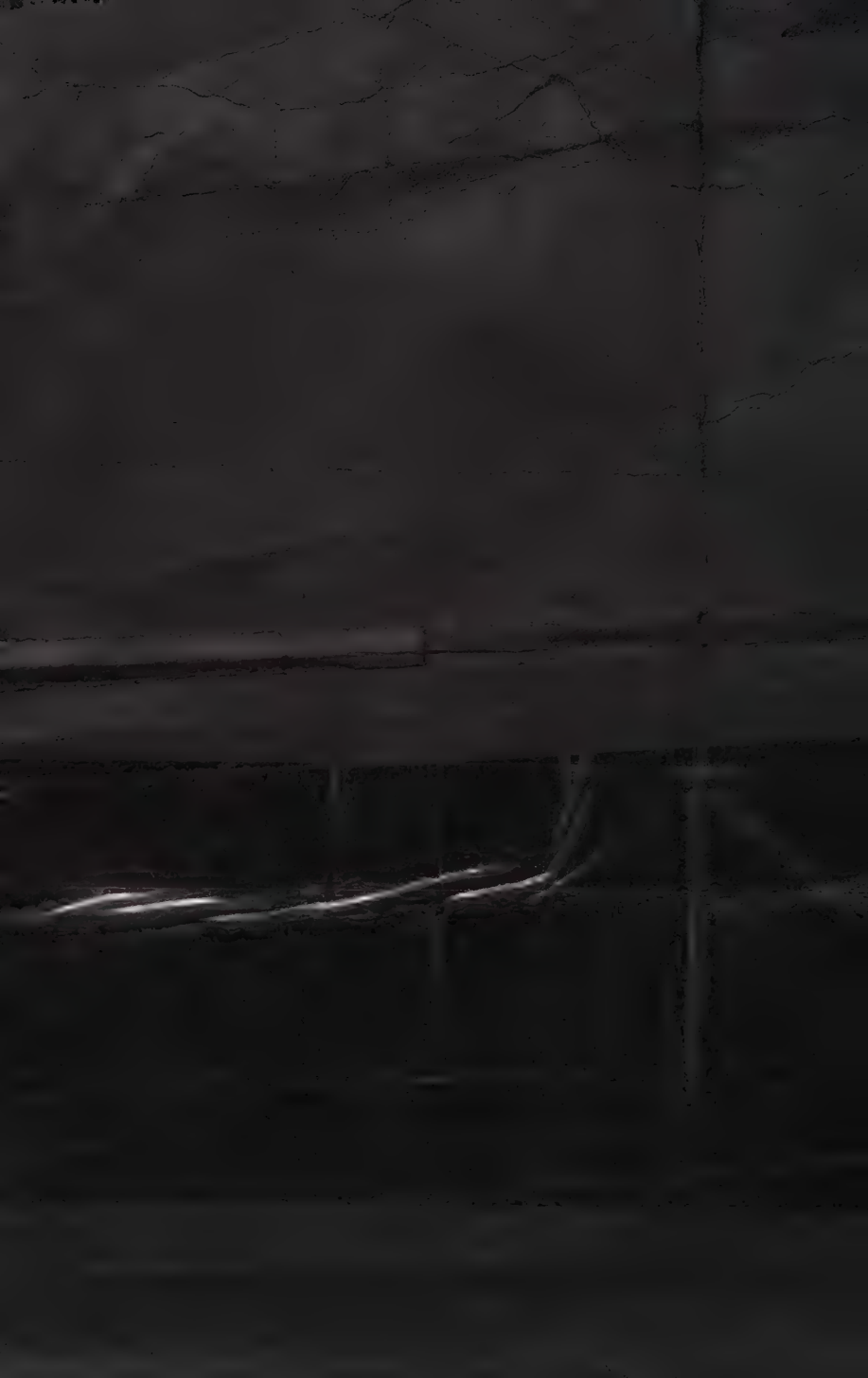

CIRCUIT BOARD
SCREEN DESIGNATIONS
RESISTORS
CAPACITORS
DIODES AND CHOKES
TRANSISTORS
INTEGRATED CIRCUIT
WIRES

Figure 3



STEP-BY-STEP ASSEMBLY

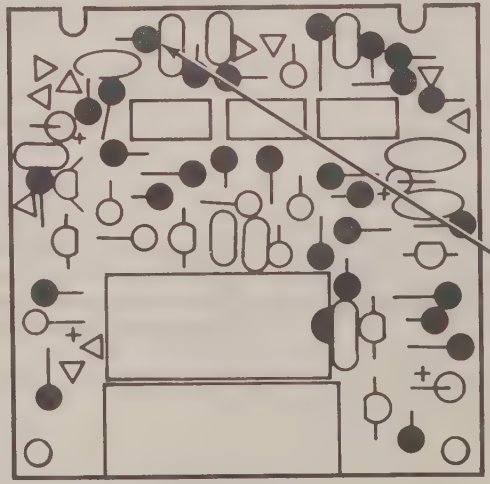
RECEIVER CIRCUIT BOARD

NOTE: All receiver circuit board Pictorials are enlarged for clarity.

START

IMPORTANT: Read the following steps carefully for detailed instructions on how to install and solder the first part on the receiver circuit board. You must bend and solder the leads of all parts to the circuit board in exactly the same manner so the connections will be strong enough to withstand the vibrations that occur in powered R/C models. This type of connection will be close to the circuit board, to allow enough clearance for the case cover. This same technique is used by major manufacturers of radio-controlled devices.

( ) Position the receiver circuit board printed-side up as shown. NOTE: The Pictorial dimensions are enlarged for the sake of clarity.

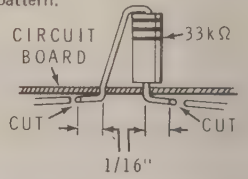


PICTORIAL 1-1

CONTINUE

( ) Hold a 33 kΩ (orange-orange-orange) resistor and bend one lead sharply over as shown.

( ) R7. Mount the 33 kΩ resistor vertically on the circuit board as shown. Then bend both leads sharply outward along the foil pattern.

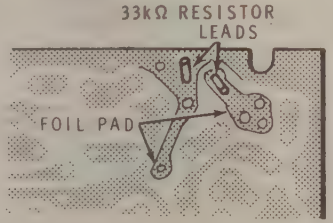


( ) Cut both resistor leads to 1/16" on the foil side of the circuit board. Use a blunt tool and firmly press the cut lead-end onto the foil surface. Be

(continued on next page)

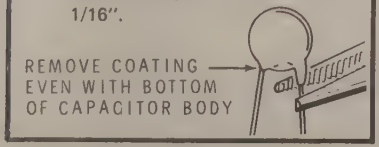
CONTINUE

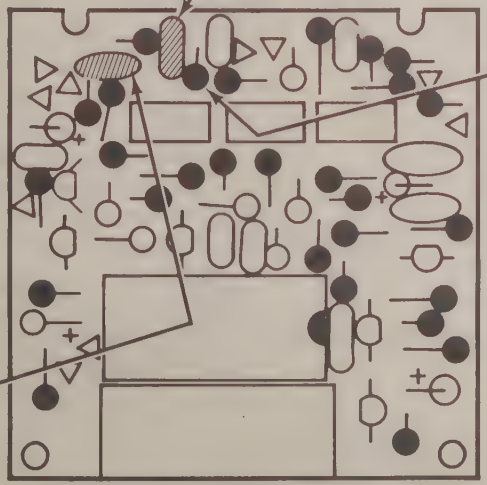
sure to keep the lead-end inside the foil pattern. On the foil side of the circuit board, the 33 kΩ resistor leads should be formed tightly against the foil to follow the contour of the foil pad as shown.



DO NOT SOLDER THE RESISTOR LEADS or the leads of the next 3 parts. Soldering instructions will be given later.

( ) C7. Similarly mount a .001 μF disc capacitor. Bend both leads against the foil so they follow the contour of the foil pad. Cut each lead to 1/16".





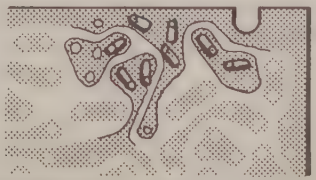
PICTORIAL 1-2

CONTINUE

( ) C18. Similarly, remove the lead coating and mount a .047 μF (473) ceramic capacitor. Bend both leads against the foil so they follow the contour of the foil pad. Cut each lead to 1/16".

( ) R11. 150 Ω (brown-green-brown). Bend one lead sharply along the body of the resistor. Mount the resistor vertically. Bend both leads against the foil so they follow the contour of the foil pad. Cut each lead to 1/16".

( ) Use a blunt tool to press all the cut leads tightly to their foil pads. Your foil pads and leads should now look like this:



SOLDERING NOTES

The following illustration, Figure 1-1, shows the correct method to solder a lead to a circuit board foil. Hold the tip of the soldering iron on the foil and against the lead to be soldered for three to four seconds. Then apply solder **to the heated foil and lead** (not the soldering iron tip) as shown.

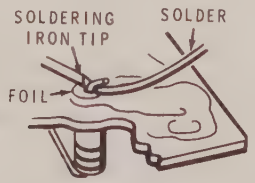


FIGURE 1-1

Allow the solder to cool before you attempt to move the connection or its associated components.

Study Figure 1-2 as you read the following paragraphs.

When both the lead and the circuit board foil are heated at the same time, the solder will flow evenly onto the lead and the foil. This will assure you of a good electrical bond between the foil and lead. Part A of Figure 1-2 shows you how a typical "good connection" looks.

If either the foil or the component lead is not heated sufficiently, a poor bond will be made between the two.

Refer to Part B of Figure 1-2: When the lead is not heated sufficiently, the solder will not flow onto the lead as shown. Reheat the connection and, if necessary, apply a small additional amount of solder to obtain a good connection, as in Part A.

Refer to Part C of Figure 1-2: When the foil is not heated sufficiently, the solder will glob around the component lead but will not adhere to the circuit board foil. Reheat the connection and, if necessary, apply a small additional amount of solder to obtain a good connection, as in Part A.

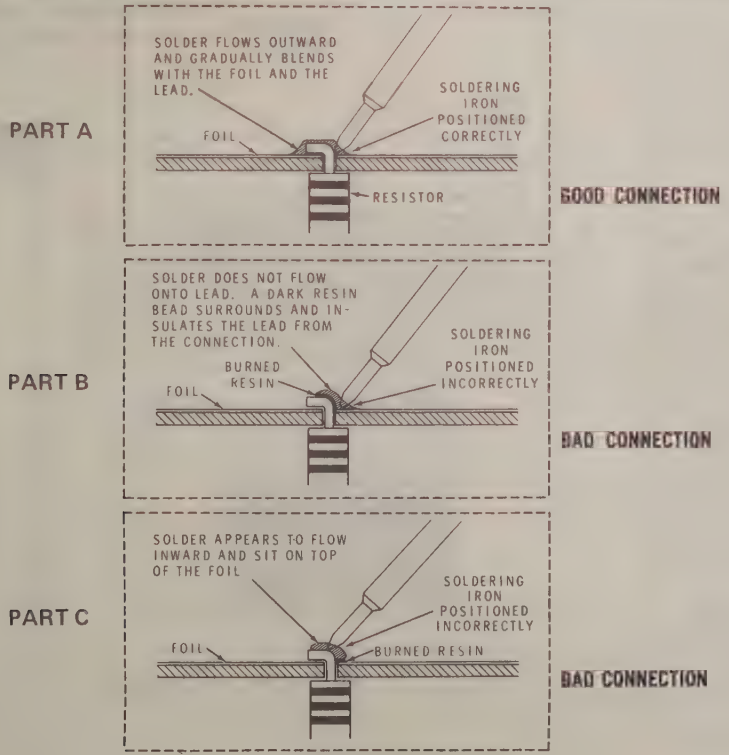

PART A
SOLDER FLOWS OUTWARD AND GRADUALLY BLENDS WITH THE FOIL AND THE LEAD.
SOLDERING IRON POSITIONED CORRECTLY
FOIL
RESISTOR
GOOD CONNECTION
PART B
SOLDER DOES NOT FLOW ONTO LEAD. A DARK RESIN BEAD SURROUNDS AND INSULATES THE LEAD FROM THE CONNECTION.
SOLDERING IRON POSITIONED INCORRECTLY
BURNED RESIN
FOIL
BAD CONNECTION
PART C
SOLDER APPEARS TO FLOW INWARD AND SIT ON TOP OF THE FOIL
SOLDERING IRON POSITIONED INCORRECTLY
FOIL
BURNED RESIN
BAD CONNECTION

Figure 1-2

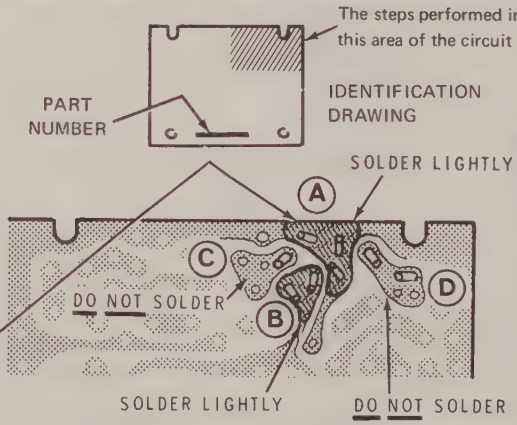
START

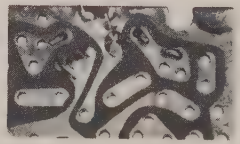
Position the circuit board foil-side-up as shown in the identification drawing. Then proceed with the following steps.

FOR GOOD SOLDER CONNECTIONS, YOU MUST **KEEP THE SOLDERING IRON TIP CLEAN.** WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.

( ) Hold the tip of the soldering iron at the side of each lead on foil pad A, in turn, as you apply a small amount of solder. Be sure the solder flows evenly on both sides of each lead, and smoothly onto the foil. NOTE: You should be able to see the outlines of the leads through the solder.

( ) In the same manner, solder two leads to foil pad B. Be sure the solder flows evenly around both component leads.





PICTORIAL 1-3

CONTINUE

NOTES:

1. Carefully inspect the foil pads you just soldered they should closely resemble the photo at the bottom of the page. Again, look at the drawing in Figure 1-2 on Page 15. Be sure you have good connections.

2. Do not solder foil pads C and D at this time. Do not solder any foil pads in the following Pictorials until all the holes in a foil pad have been filled.

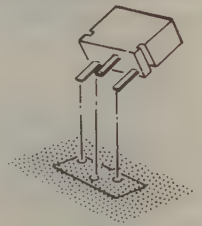
3. No specific solder instructions will be given from this page on. Solder any foil pad as soon as leads have filled the holes in a pad.

4. Proceed slowly and carefully.

START

In the next three steps, install ceramic filters in the following manner:

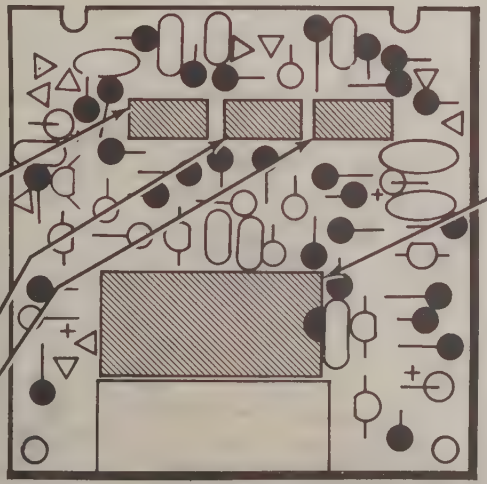
Line up the pins of the filter with the correct holes in the circuit board. Then push the filter into place. Twist and bend the pins over onto the foil.



( ) CF3. Ceramic filter (#404-399).

( ) CF2. Ceramic filter (#404-399).

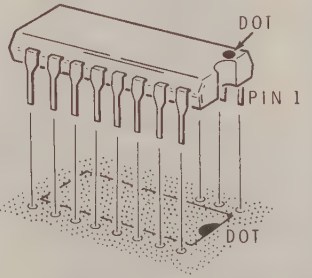
( ) CF1. Ceramic filter (#404-399).

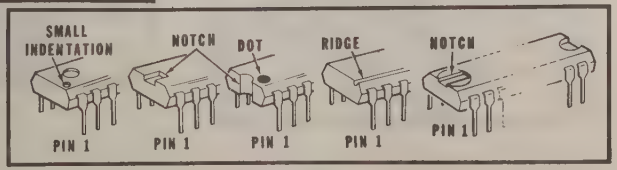


PICTORIAL 1-4

CONTINUE

( ) IC1. Integrated circuit SCUSO127 (#443-689). Refer to Detail 1-4A and identify the pin 1 end of the IC. Then position the pin 1 end over the dot printed on the circuit board. Push the IC down onto the circuit board. Cut the leads to 1/16" and fold them onto the circuit board foils.

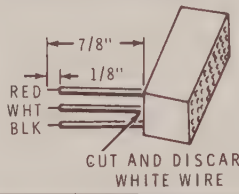




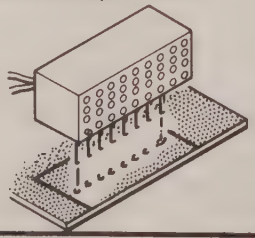
Detail 1-4A

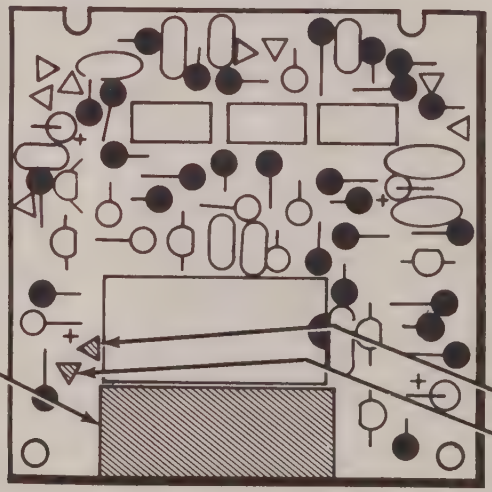
START

( ) Prepare the connector block as shown. Cut off and discard the white wire. Cut the black and red wires to 7/8", then remove 1/8" of insulation from each wire end. Tightly twist each wire end and apply a small amount of solder to hold the strands together.



( ) Position the connector block with its leads as shown. Then push the pins of the connector block into their holes on the circuit board. Do not solder the pins to the foil.



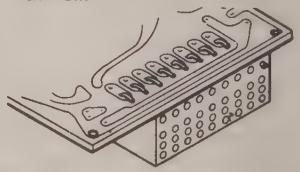


PICTORIAL 1-5

CONTINUE

IMPORTANT: Be sure to bend over and cut off all leads to the foils exactly as you were instructed on Page 12. If you do not, vibrations may loosen your connections and disable the Receiver.

( ) Bend the connector block pins over against the foil toward the edge of the board as shown below. Then cut each pin to 1/16" and solder it to the foil.



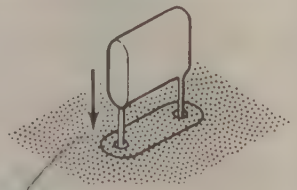
In the following steps, bend each connector block wire down onto the foil after you insert it into the indicated hole (Δ).

( ) 7/8" red wire.

( ) 7/8" black wire.

START

In the following steps, mount five .047 μF (473) ceramic capacitors as shown. Push each capacitor down onto the board.



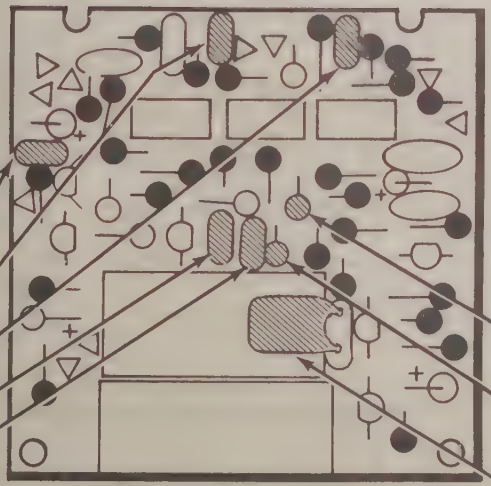
( ) C11. .047 μF (473) ceramic.

( ) C9. .047 μF (473) ceramic.

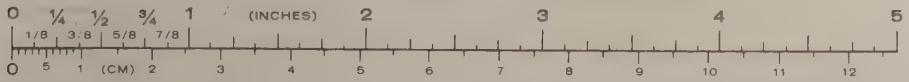
( ) C8. .047 μF (473) ceramic.

( ) C15. .047 μF (473) ceramic.

( ) C13. .047 μF (473) ceramic.



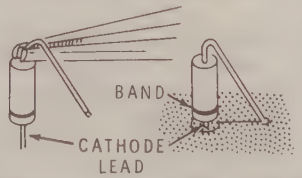
PICTORIAL 1-6



CONTINUE

In the following steps, install diodes in this manner:

1. Hold the diode lead with pliers so you do not break the diode body.
2. Bend the lead before installing the diode.
3. Position the diode on the circuit board as directed in each step.



( ) D2. 1N4148 diode (#56-84). Position the banded end down.

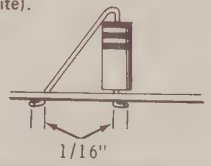
( ) D3. 1N4148 diode (#56-84). Position the banded end down.

( ) C22. .047 μF Mylar capacitor. Bend the capacitor body over the top of the IC as shown before you cut and solder its leads.

START

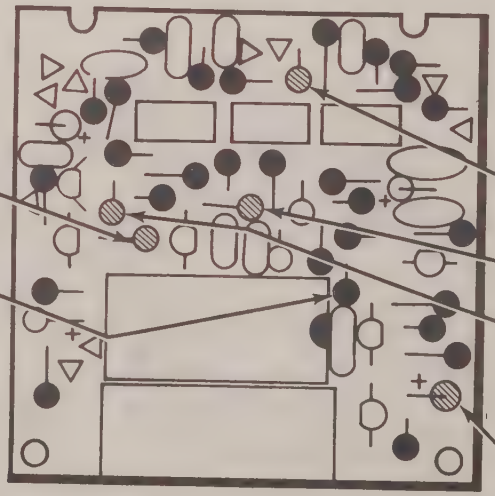
IMPORTANT Be sure to bend over and cut off all leads to the foils exactly as you were instructed on Page 12.

( ) C14. 180 pF tubular capacitor (#21-174, brown-gray-brown-white).



( ) R31. 150 kΩ (brown-green-yellow).

FOR GOOD SOLDER CONNECTIONS, YOU MUST **KEEP THE SOLDERING IRON TIP CLEAN.** WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



CONTINUE

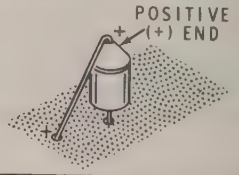
In the next three steps, mount banded chokes as shown.

( ) L1. 2.2 μH choke (#45-73, red-red-gold-silver).

( ) L3. 1.0 mH choke (#45-80, brown-black-red-silver).

( ) L2. 1.0 mH choke (#45-80, brown-black-red-silver).

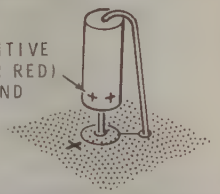
( ) C21. 33 μF tantalum. [Position the positive (pointed) end UP.]



PICTORIAL 1-7

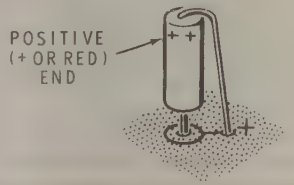
START

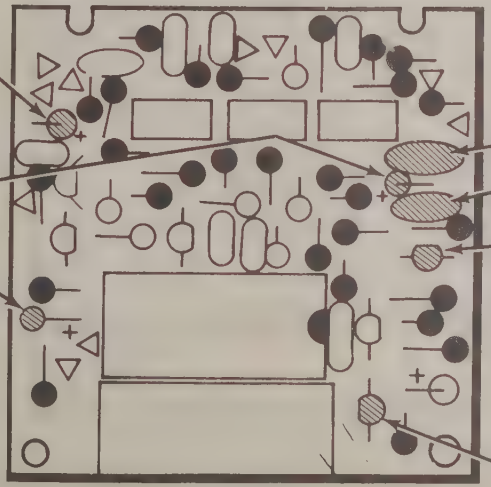
( ) C12. 1 μF tantalum. Position the positive (red) end DOWN.



( ) C17. 1 μF tantalum. Position the positive (red) end DOWN.

( ) C23. 2.2 μF tantalum. Position the positive (red) end UP.





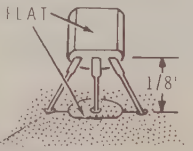
CONTINUE

NOTE: Check the leads of each disc capacitor as you install it. Remove the coating from each capacitor lead as shown. This coating could cause a poor solder connection.

( ) C16. .005 μF disc.

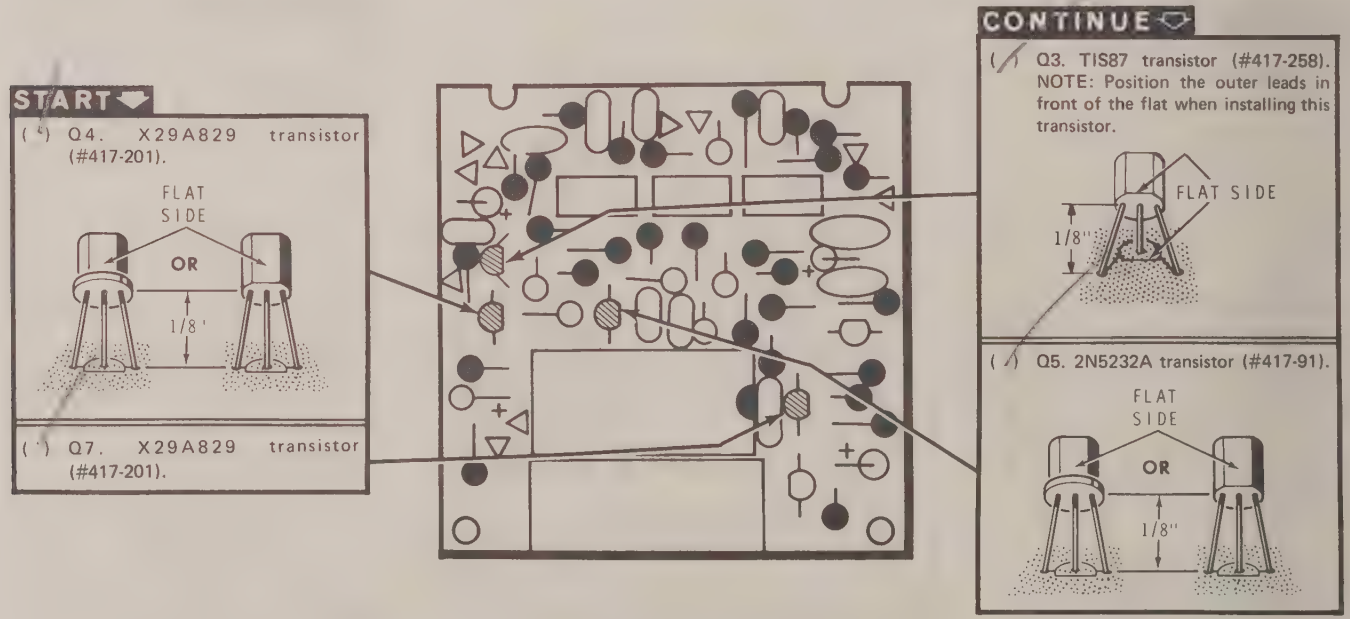
( ) C19. .001 μF disc.

( ) Q6. MPSA20 transistor (#417-801). Carefully note the position of the flat on the circuit board.



( ) Q8. MPSA20 transistor (#417-801).

PICTORIAL 1-8



PICTORIAL 1-9

START

IMPORTANT Be sure to bend over and cut off all leads to the foils exactly as you were instructed on Page 12.

( ) R18. 15 kΩ (brown-green-orange).

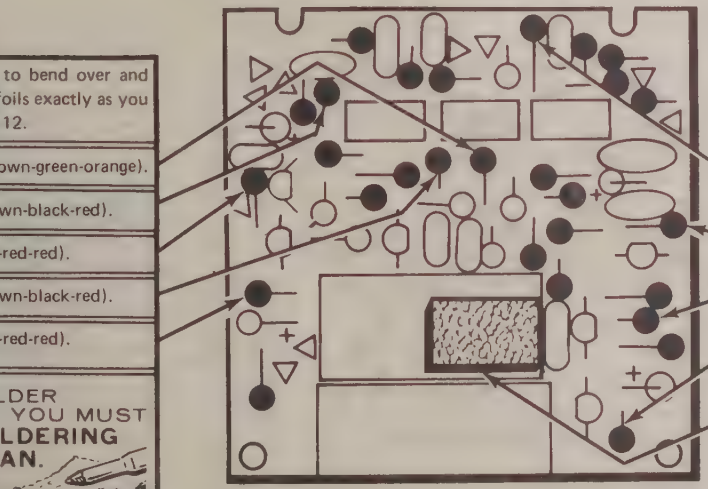
( ) R12. 1000 Ω (brown-black-red).

( ) R15. 2200 Ω (red-red-red).

( ) R19. 1000 Ω (brown-black-red).

( ) R16. 2200 Ω (red-red-red).

FOR GOOD SOLDER CONNECTIONS, YOU MUST **KEEP THE SOLDERING IRON TIP CLEAN.** WIPE IT OFTEN WITH A DAMP SPONGE OR CLOTH.



CONTINUE

( ) R9. 6800 Ω (blue-gray-red).

( ) R25. 68 kΩ (blue-gray-orange).

( ) R26. 47 kΩ (yellow-violet-orange).

( ) R29. 1000 Ω (brown-black-red).

( ) Cut a 1/2" length of foam tape. Remove the paper backing from the tape; then press the tape in place, squarely on top of capacitor C22.

PICTORIAL 1-10

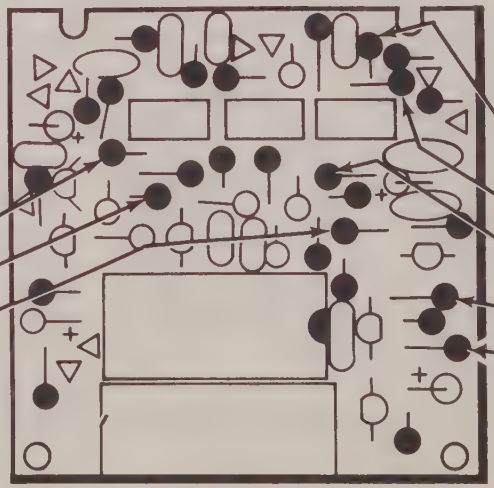
START

NOTE: The following three resistors have similar color bands. Be sure each resistor is the correct one before you install it.

( ) R13. 2700 Ω (red-violet-red).

( ) R14. 2200 Ω (red-red-red).

( ) R24. 22 kΩ (red-red-orange).



CONTINUE

( ) R4. 5600 Ω (green-blue-red).

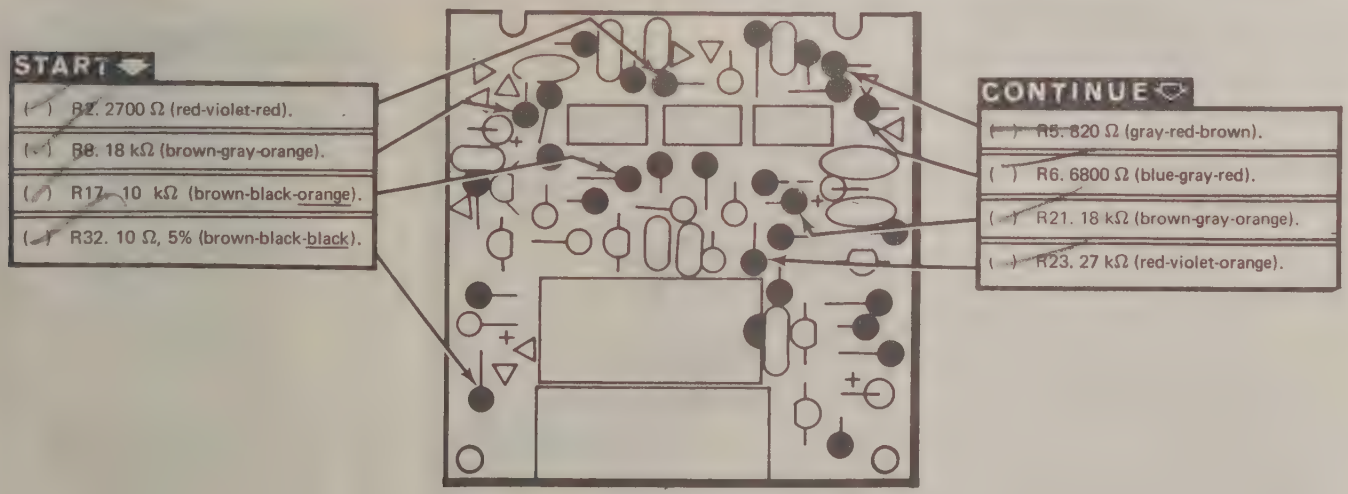
( ) R3. 100 Ω (brown-black-brown).

( ) R22. 10 kΩ (brown-black-orange).

( ) R27. 47 kΩ (yellow-violet-orange).

( ) R28. 10 kΩ (brown-black-orange).

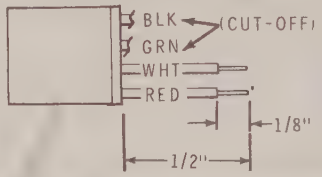
PICTORIAL 1-11


START
( ) R2. 2700 Ω (red-violet-red).
( ) R8. 18 kΩ (brown-gray-orange).
( ) R17. 10 kΩ (brown-black-orange).
( ) R32. 10 Ω, 5% (brown-black-black).
CONTINUE
( ) R5. 820 Ω (gray-red-brown).
( ) R6. 6800 Ω (blue-gray-red).
( ) R21. 18 kΩ (brown-gray-orange).
( ) R23. 27 kΩ (red-violet-orange).

PICTORIAL 1-12

START

( ) Cut the green and black leads from a 4-pin socket w/leads. Then cut the red and white leads to 1/2" as shown. Hold the leads with pliers and remove 1/8" of insulation from the lead ends. Then apply a small amount of solder to each lead end to hold the strands together.

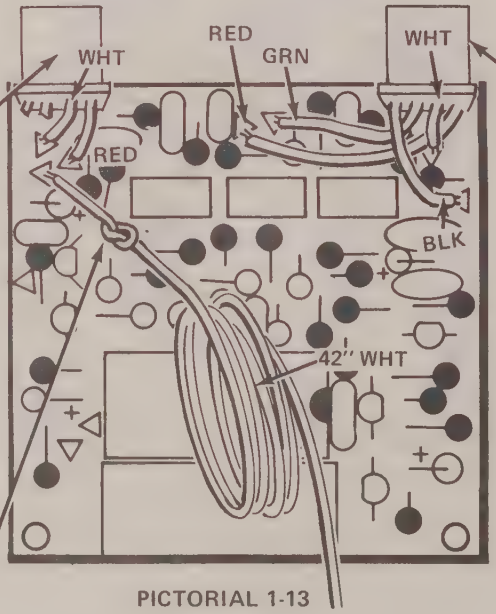


( ) 4-pin socket w/leads. Connect the leads as shown.

( ) Cut the white wire to 42".

( ) Tie an overhand knot in the 42" white wire 5/8" from one end. Remove 1/4" of insulation from the knotted wire end. Apply a small amount of solder to hold the strands together.

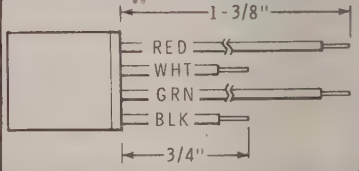
( ) Connect the knotted end of the 42" white wire.



PICTORIAL 1-13

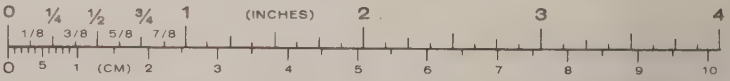
CONTINUE

( ) Prepare a 4-pin socket w/leads as shown. Cut the red and green leads to 1-3/8" and the white and black leads to 3/4". Then hold the leads with pliers and remove 1/8" of insulation from each lead end and apply a small amount of solder to hold the small strands together.



( ) 4-pin socket w/leads. Connect the four wires as shown; the red wire first, and then the white, green, and black wires.

NOTE: A 15 kΩ (brown-green-orange) resistor is left over. It will be used later.



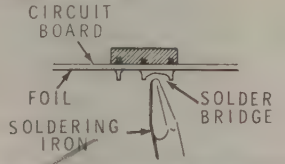
FOIL INSPECTION

START

( ) Turn the receiver circuit board foil-side-up as shown. There is one unused hole on the circuit board.

NOTE: It is suggested that you clean your circuit board foil with a light application of solvent (lacquer thinner, alcohol, dope thinner, etc.) and a stiff brush.

NOTE: In the following steps, you will check for solder bridges by comparing each section of foil with the foil view shown. If you cannot answer yes to all of the following questions, turn the circuit board foil-side-down and hold the soldering iron tip between the two points that are bridged. The solder will flow down the iron tip.



( ) Does your foil look like this?

( ) Do your three foils look like these?

PICTORIAL 1-14

CONTINUE

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

START

FOIL INSPECTION (cont'd.)

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

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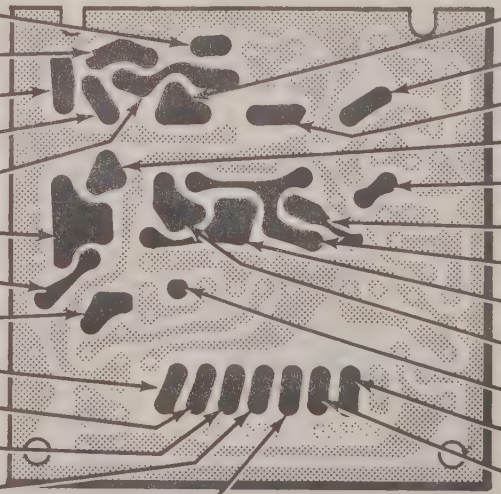
( ) Does your foil look like this?



CONTINUE

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

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( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

( ) Does your foil look like this?

PICTORIAL 1-15

RECEIVER MODULE ASSEMBLY

Refer to Pictorial 2-1 (fold-out from Page 29) for the following steps.

NOTE: In the next three steps, perform them together rather than treat them separately. It may be necessary, for instance, to do part of the first step, then part of the third step, then the second step, and so on.

Assemble the receiver circuit board and the module as follows:

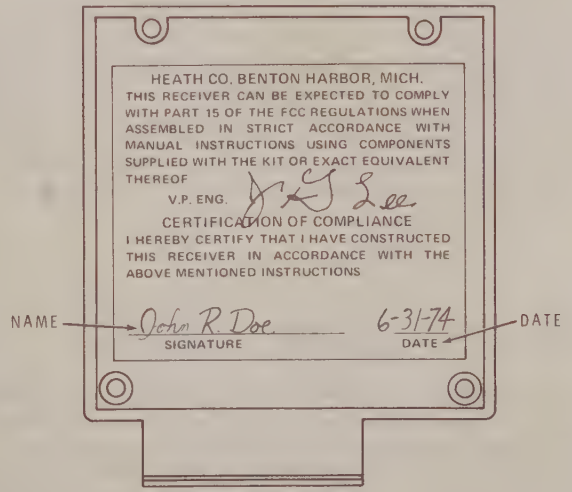
( ) Start the free end of the 42" white wire through hole A in the case top section as shown. Pull the wire through the case until the small knot is against the inside of the hole.

( ) Position the two 4-pin sockets down into their respective slots in the case top section. Be sure the wide spaces are up as shown in the Pictorial. Fully seat the sockets into their slots.

( ) Position the circuit board so its four holes are aligned with the four holes in the case. NOTE: It may be necessary to slightly reposition the tops of some components to properly seat the board into the case.

( ) Refer to Detail 2-1A. Sign your name and enter today's date on the FCC label as shown. Then, peel the backing paper from the label and press the label in place on the inside of the case bottom section as shown.

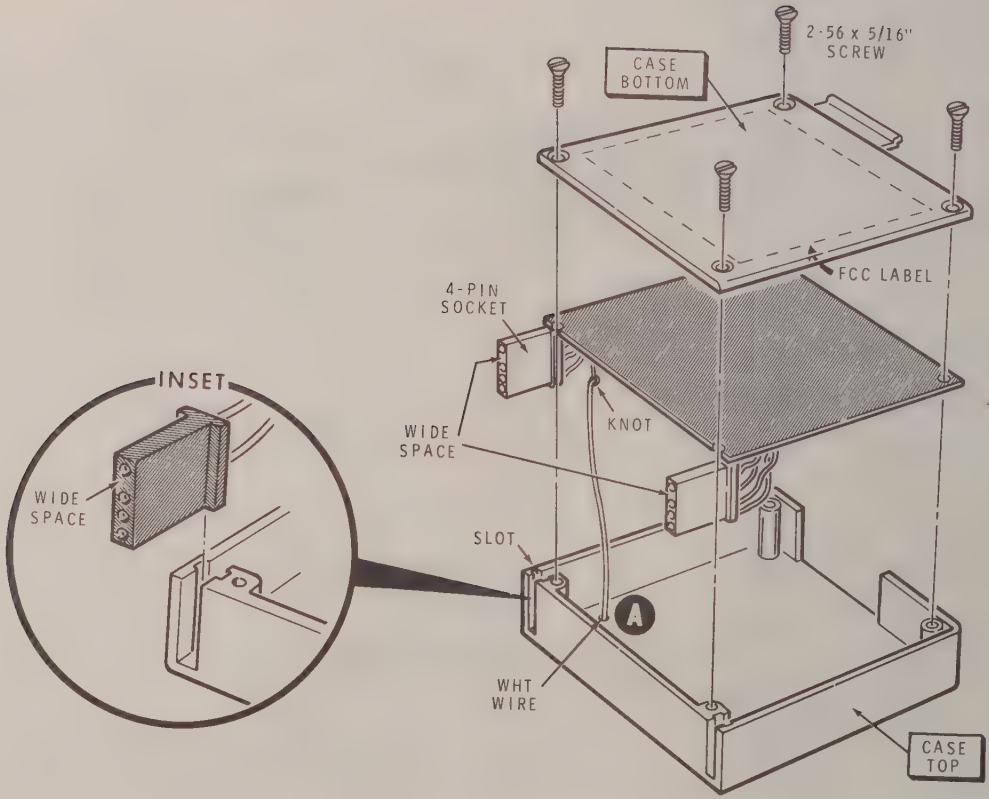
( ) Temporarily secure the case bottom section to the case top section with four 2-56 x 5/16" screws as shown in the Pictorial. Do not overtighten the screws.


HEATH CO. BENTON HARBOR, MICH.
THIS RECEIVER CAN BE EXPECTED TO COMPLY WITH PART 15 OF THE FCC REGULATIONS WHEN ASSEMBLED IN STRICT ACCORDANCE WITH MANUAL INSTRUCTIONS USING COMPONENTS SUPPLIED WITH THE KIT OR EXACT EQUIVALENT THEREOF
V.P. ENG.
CERTIFICATION OF COMPLIANCE
I HEREBY CERTIFY THAT I HAVE CONSTRUCTED THIS RECEIVER IN ACCORDANCE WITH THE ABOVE MENTIONED INSTRUCTIONS
NAME
John R Doe
SIGNATURE
6-31-74
DATE
DATE

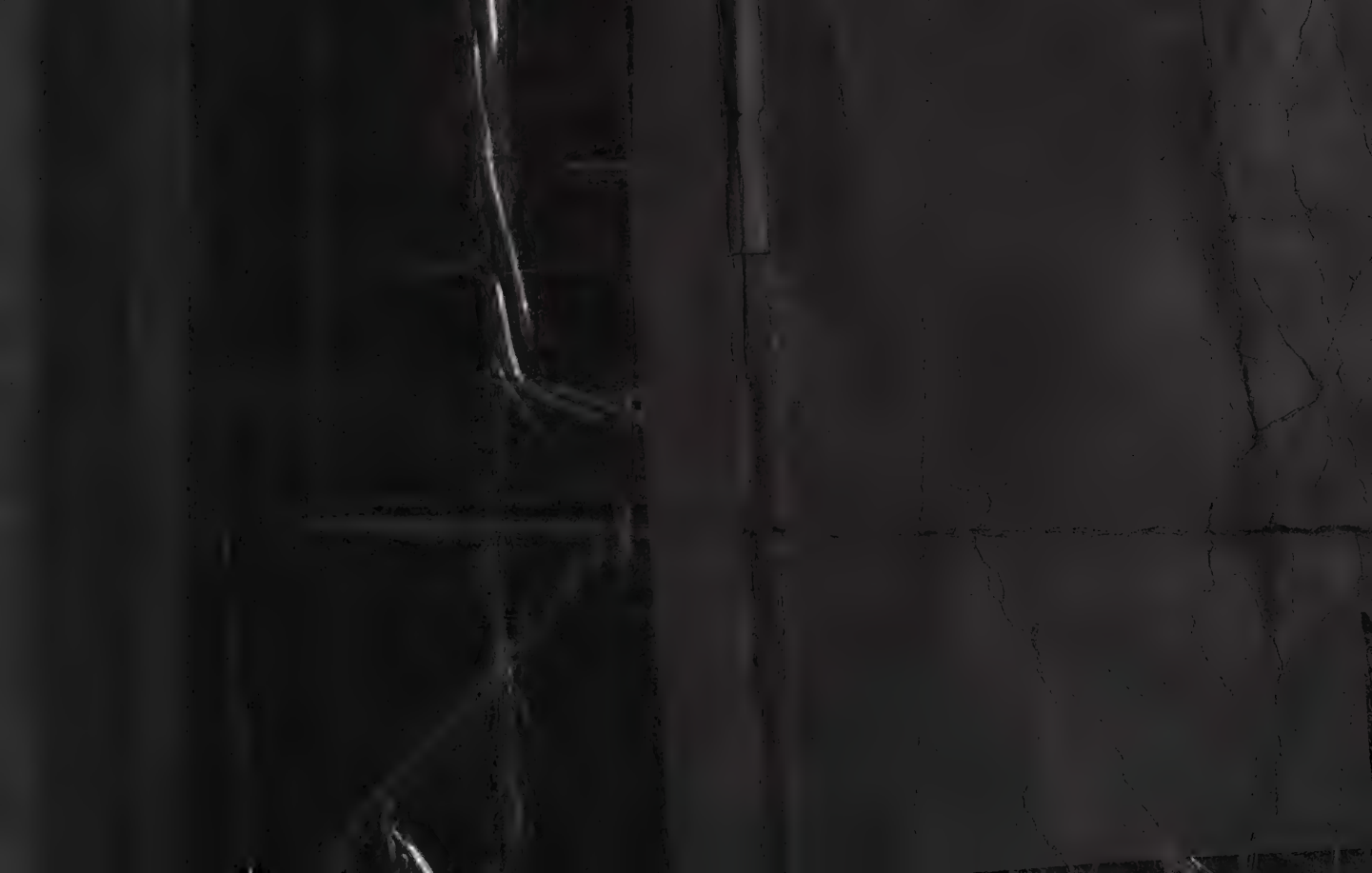
Detail 2-1A

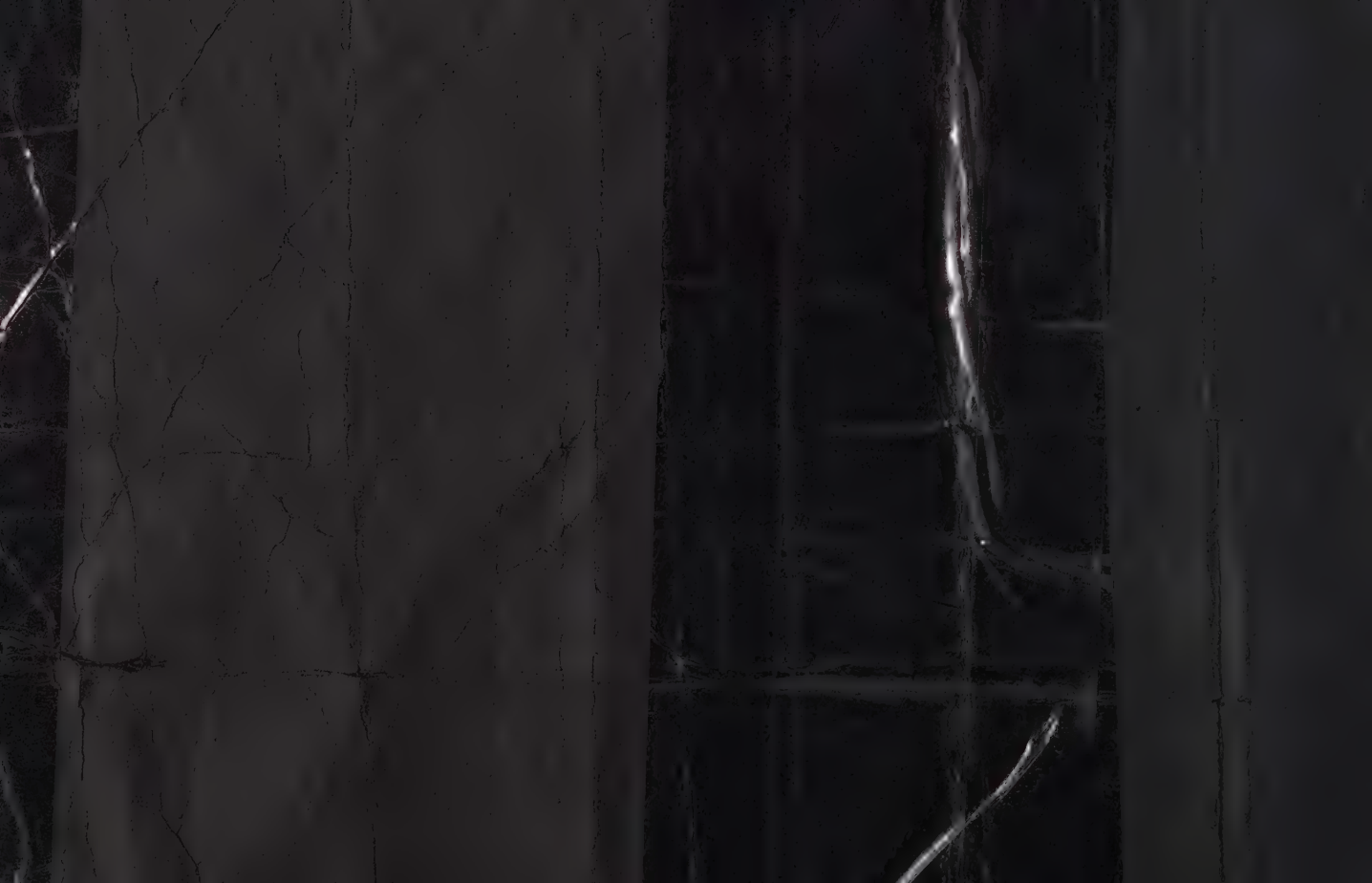
NOTE: The blue and white label you mount in the following steps shows the Model number and the Production Series number of your kit. Refer to these numbers in any communications you may have with the Heath Company.

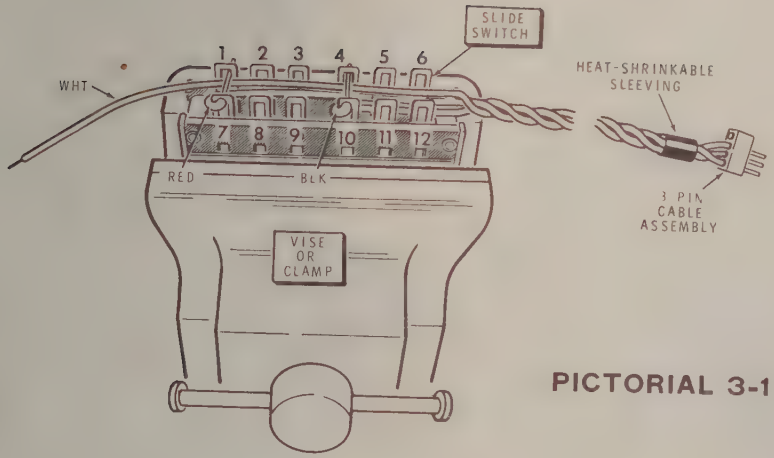
( ) If you have not already done so, carefully peel the backing paper from the blue and white label. Then press the label onto the front cover of this Assembly Manual or in the Parts List on Page 9.



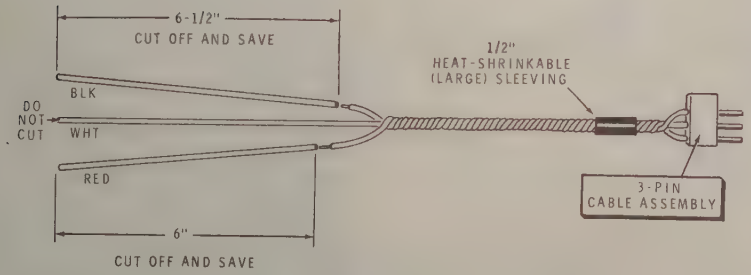
PICTORIAL 2-1







PICTORIAL 3-1



Detail 3-1A

Refer to Pictorial 2-2 for the following steps.

NOTE: In the next step you will peel one of the operating mode labels from the connector label and install it on the Receiver case. The following boxed-in information applies only if you have a dual-stick transmitter. If you have a single-stick transmitter, disregard the boxed-in information.

At this time you must decide which mode of operation you will use. The mode of operation merely means which control stick is going to operate which function on your model. The three modes of operation in popular use are:

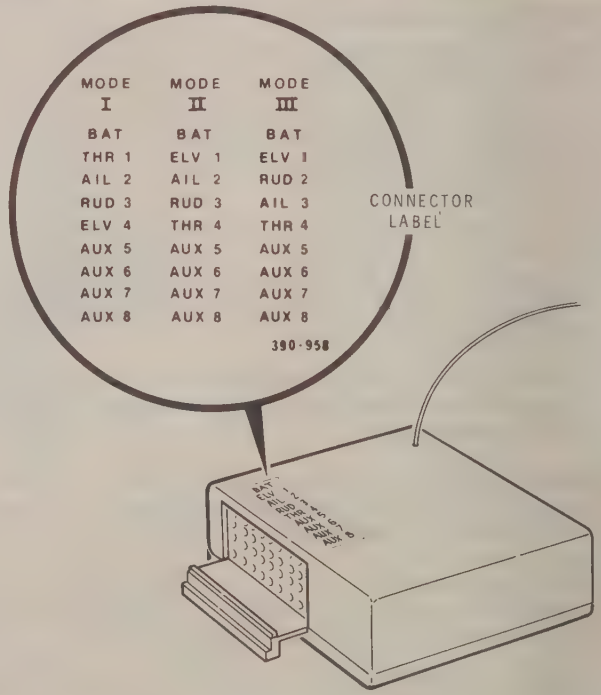
	Left Control Stick	Right Control Stick
Mode I	Rudder-Elevator	Aileron-Throttle
Mode II	Rudder-Throttle	Aileron-Elevator
Mode III	Aileron-Throttle	Rudder-Elevator

If you are unfamiliar with model control, we suggest that you follow Mode II instructions, or consult a local modeler for advice on which Mode to use. The mode of operation is one of personal preference and all work equally well.

( ) Install the appropriate label on your Receiver case as shown. If you have a single-stick transmitter, use the Mode II label. If you have a dual-stick transmitter, use the label you selected after reading the information in the box above.

1. Peel the label from the sheet.
2. Line up the lettering on the label with the holes in the connector. NOTE: The label will fit within the embossed outline on the case.
3. Press the label onto the case.

( ) Set the receiver module aside temporarily.



PICTORIAL 2-2

BATTERY SWITCH AND CONNECTORS

Refer to Pictorial 3-1 (fold-out from Page 30) for the following steps:

NOTE: If you have a modeler's vise or a suitable clamp, it will aid you as you perform the following operations.

( ) Position the slide switch as shown in the Pictorial.

( ) Check the spacing between the lugs of the slide switch. Be sure that none of them are bent, and that there is at least 1/8" between the side-to-side lugs 1 through 6 and 7 through 12 as shown.

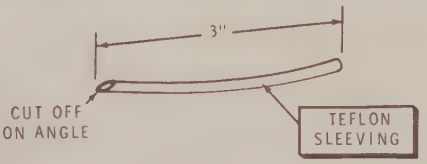
Refer to Detail 3-1A (fold-out from Page 30) for the following steps:

( ) Cut a 1/2" length of heat-shrinkable (large) sleeving. Slide this short length of sleeving over the wires of the 3-pin cable assembly.

( ) Unwind the wires of the 3-pin cable assembly for approximately 8".

( ) Cut the black wire 6-1/2" from the end. Save this wire.

( ) Cut the red wire 6" from the end. Save this wire.



Detail 3-1B

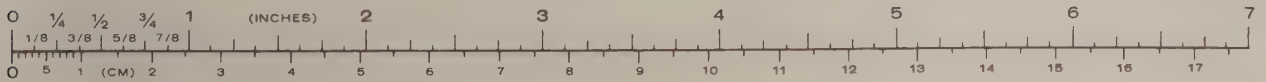
NOTE: To prepare a wire end, first remove 1/4" of insulation. Then tightly twist the small strands and melt a small amount of solder on them to hold the strands together.

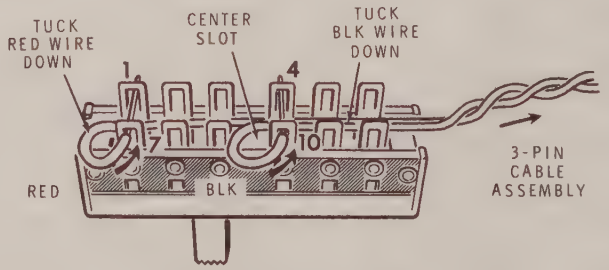
( ) Prepare the red and black wire ends that remain on the 3-pin cable assembly.

( ) Refer to Detail 3-1B and cut a 3" length of white Teflon sleeving. With a sharp tool, cut a sharp angle at one end of the sleeving as shown.

NOTE: This 3" length of Teflon sleeving will be used as a heat shield and as a spacer in the following steps so you do not burn the insulation on switch wiring.

( ) Temporarily fold the black and white wires back along the cable toward the 3-pin assembly.





Detail 3-1C

Refer to Detail 3-1C for the following steps.

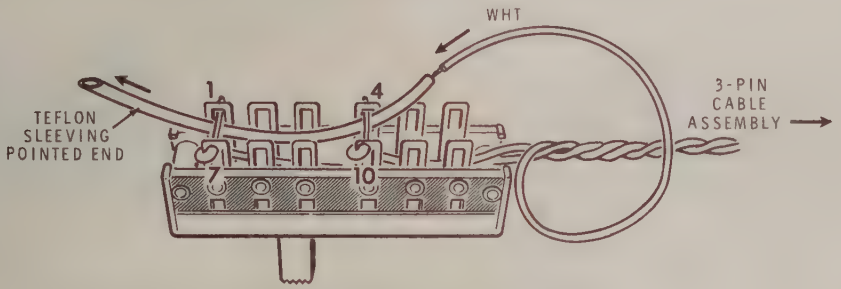
NOTE: Do not change the position of the slide switch after you start to wire it in the next step.

( ) Position the red wire into the center slot of the slide switch so the plug end of the cable is to your right.

( ) Route the end of the red wire around as shown. Be sure to keep the insulated portion of the red wire tucked down into the switch center slot. Push the end of the red wire through switch lugs 7 and 1. Do not solder these lugs.

( ) In the same manner, tuck the free end of the black wire into the center slot of the switch.

( ) Route the free end of the black wire exactly as shown. Push the end of the black wire through switch lugs 10 and 4. Do not solder these lugs.



Detail 3-1D

Refer to Detail 3-1D for the following steps:

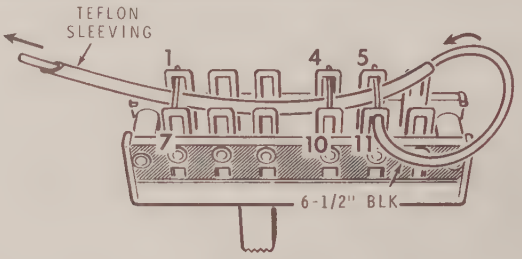
( ) Tuck the red and black wires down into the center slot as shown, and temporarily push the Teflon sleeve under the wires between the switch lugs, but on top of the red and black wires. NOTE: This will prevent the insulation from being burned, and will also space the wires in the switch lugs to the tops of their slots to allow more room for further wiring.

( ) Solder switch lugs 7 and 1 and lugs 10 and 4. Cut off any excess wire ends from lugs 1 and 4.

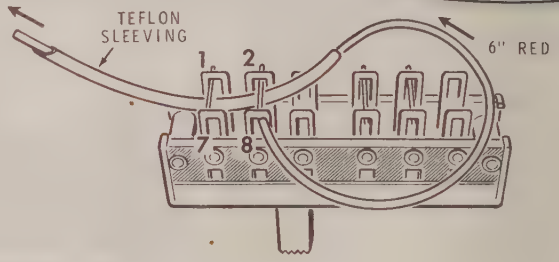
( ) Pass the free end of the white wire into the end of the Teflon sleeve as shown. Push the white wire all the way through the sleeve so the wire is under the soldered lug wires.

( ) Pull the Teflon sleeve from the center of the switch leaving the white wire under the soldered lugs.

( ) At the plug end of the red, black, and white wires, firmly pull the cable so the black and red wires are snug around their respective switch lugs and the white wire is stretched straight out to your left as shown in Pictorial 3-1 (fold-out from Page 30).



Detail 3-2A



Detail 3-2B

Refer to Pictorial 3-2 (fold-out from Page 35) and to Detail 3-2A for the following steps.

( ) Prepare one end of the 6-1/2" black and the 6" red wires that were cut from the end of the 3-pin cable assembly.

( ) Pass the prepared end of the 6-1/2" black wire through switch lugs 11 and 5. Do not solder the lugs.

( ) Pass the tip of the Teflon sleeve under the wires (11-5 and 7-1) as shown in Detail 3-2A.

( ) Solder lugs 11 and 5. Cut off any excess wire length at lug 5.

( ) Pass the free end of the black wire all the way through the Teflon sleeve.

( ) Remove the Teflon sleeve. Pull on the free end of the black wire until it is snugly wrapped around switch lug 11 as shown in the Pictorial.

Refer to Detail 3-2B for the following steps.

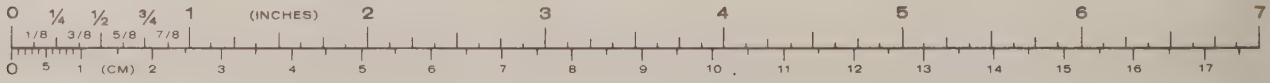
( ) Pass the tip of the Teflon sleeve under the wires (7-1) between the lugs as shown in the Detail.

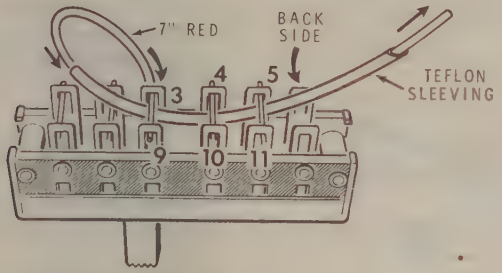
( ) Pass the prepared end of the 6" red wire through switch lugs 8 and 2 over the top of the Teflon sleeve. Then solder switch lugs 8 and 2. Cut off any excess wire end from lug 2.

( ) Pass the free end of the red wire through the Teflon sleeve as before.

( ) Remove the Teflon sleeve. Position the wire snugly around lug 8 as shown in Pictorial 3-2.

( ) At end B of the switch, twist the red, black, and white wires together as shown. Then cut all three wires to the length of the shortest wire. NOTE: Do not cut the wires back more than necessary.





Detail 3-3A

Refer to Pictorial 3-3 (fold-out from this page) for the following steps.

( ) Prepare one end of a 7" red and a 7" black wire.

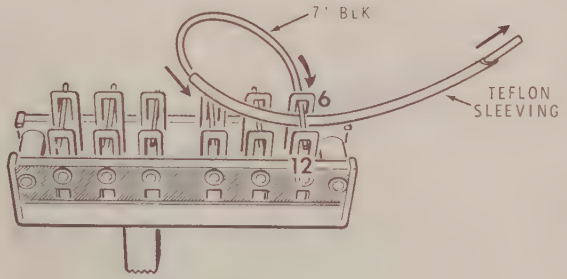
NOTE: In the following steps, you will insert the red and black wires from the back of the switch, just opposite the preceding four wires.

Refer to Detail 3-3A for the following steps.

( ) Pass the tip of the Teflon sleeve under the wires (10-4 and 11-5) as shown.

( ) Pass the prepared end of the 7" red wire through switch lugs 3 and 9 over the top of the Teflon sleeve. Then solder switch lugs 3 and 9. Cut any excess wire from lug 9.

( ) Pass the free end of the red wire through the Teflon sleeve; then remove the sleeve. Position the wire snugly around lug 3 as shown in Pictorial 3-3.



Detail 3-3B

Refer to Detail 3-3B for the following steps.

( ) Pass the prepared end of the 7" black wire through switch lugs 6 and 12. Do not solder the lugs.

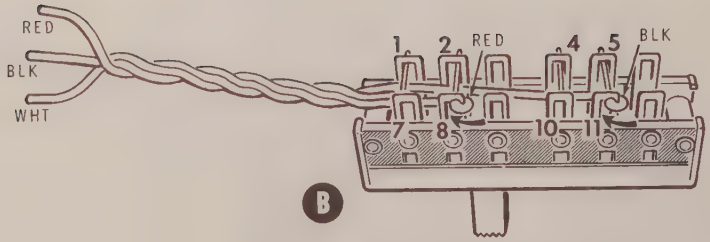
( ) Pass the tip of the Teflon sleeve under the wires between lugs 6 and 12.

( ) Solder switch lugs 6 and 12. Cut any excess wire from lug 12.

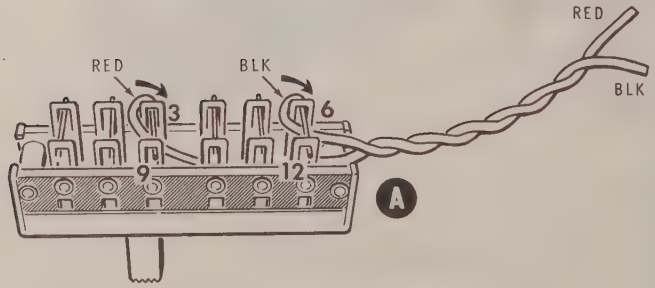
( ) Pass the free end of the black wire through the Teflon sleeve. Then remove the Teflon sleeve.

( ) Form the black wire snugly around lug 6 as shown in Pictorial 3-3.

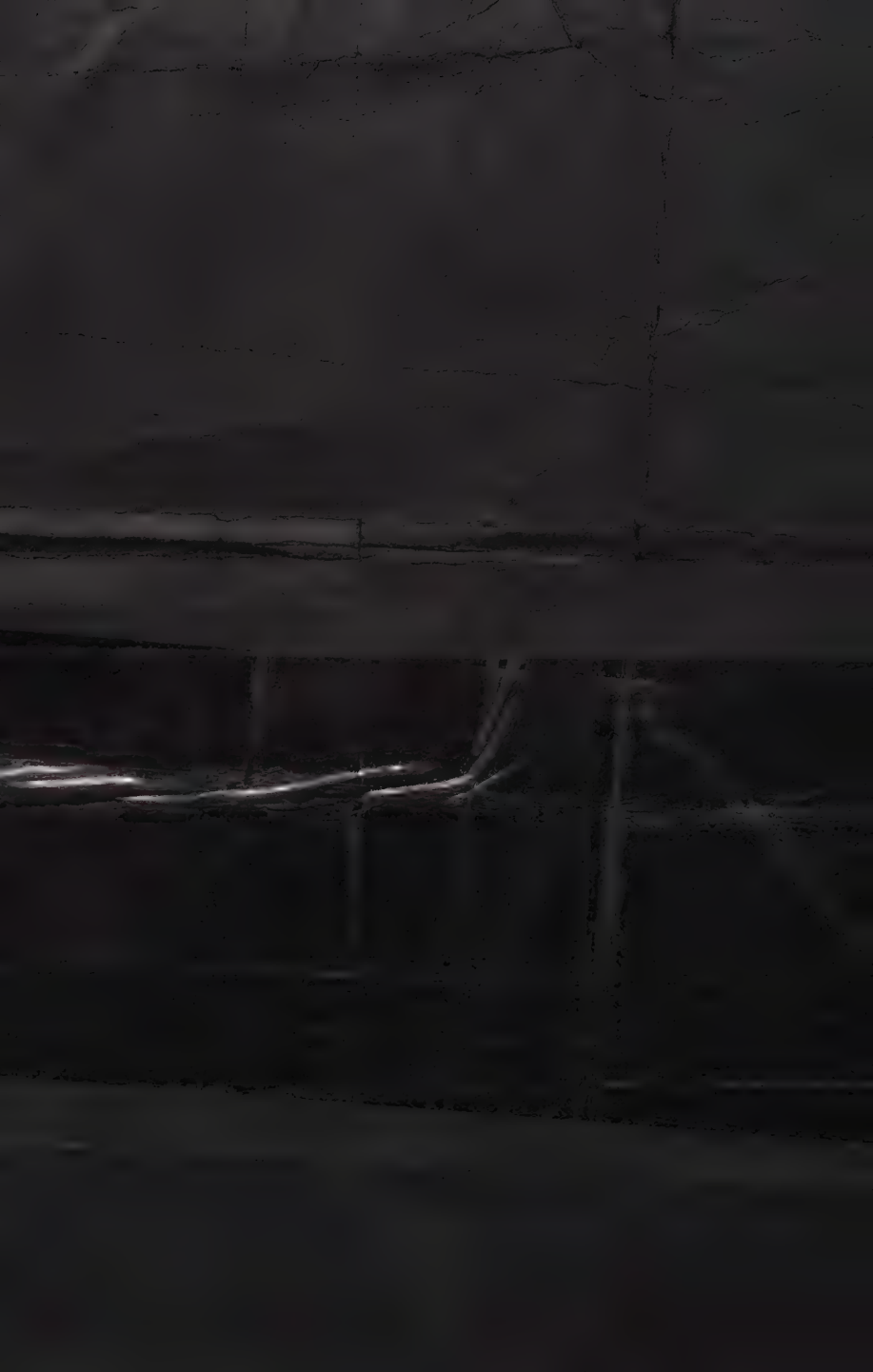
( ) Tightly twist the red and black wires together at end A of the switch. Cut the longer wire back so it is the same length as the shorter wire.

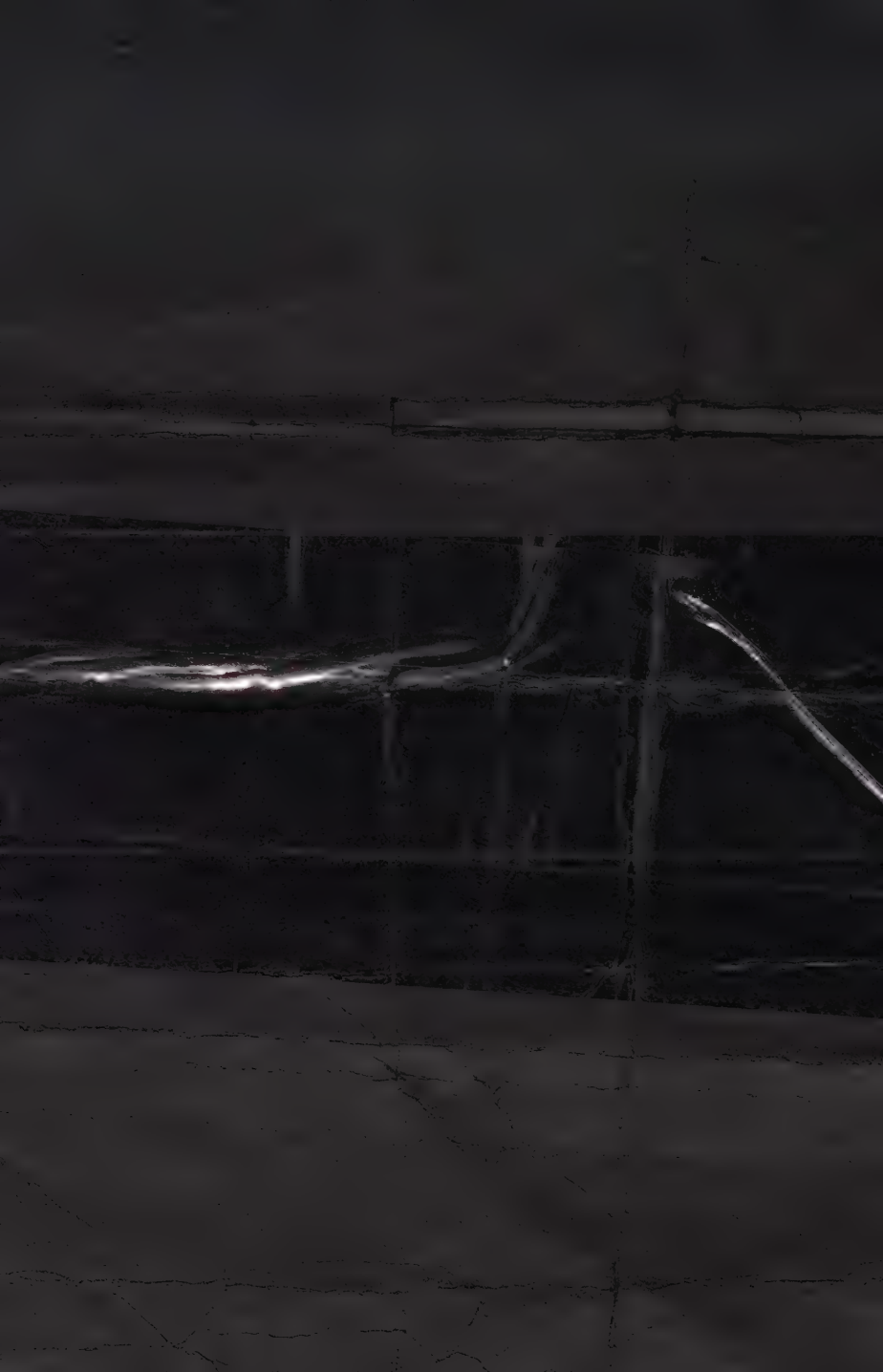


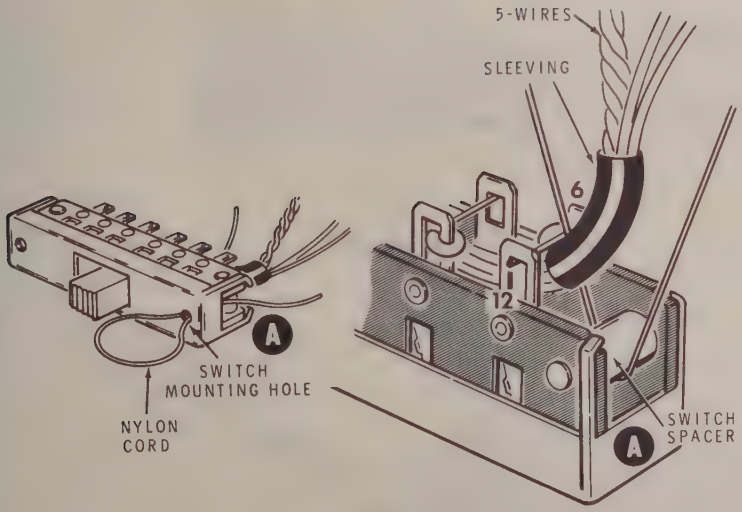
PICTORIAL 3-2



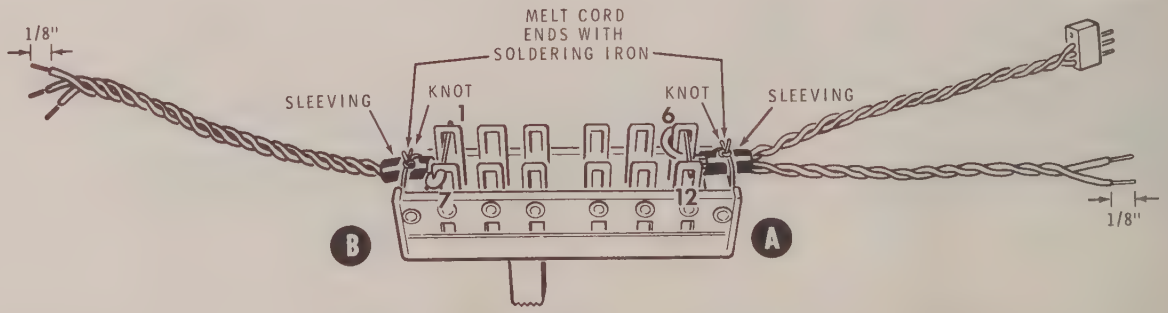
PICTORIAL 3-3






5-WIRES
SLEEVING
6
12
A
SWITCH
MOUNTING HOLE
NYLON
CORD
A
SWITCH
SPACER

Detail 3-4A



PICTORIAL 3-4

Refer to Pictorial 3-4 and Detail 3-4A (fold-out from this page) for the following steps.

( ) Cut the nylon cord into two equal lengths.

( ) Temporarily fold the five wires coming from end A of the slide switch up and back over the switch lugs as shown in the Detail.

NOTE: In the following step, you will pass the nylon cord through the mounting hole in the slide switch only to get it around the spacer inside and at the end of the switch. The cord will not form a loop outside the switch mounting hole; the hole is only used for access during this operation.

( ) Place the nylon cord around the switch spacer in the following manner:

1. Pass one end of a nylon cord upward through switch mounting hole A, as shown in the Detail, and inside the switch spacer.
2. Pass the other end of the nylon cord upward through hole A so it passes on the outside of the switch spacer.
3. Pull upward on both ends of the cord so it is around the spacer.

( ) Push the free ends of the black and red wires through the large heat-shrinkable sleeving on the 3-pin cable assembly. Then slide the sleeving all the way toward the switch until it is snug against lugs 6 and 12.

NOTE: To tie the knot in the next step, grasp the ends of the nylon cord with pliers, or place one end of the cord between the vise jaws and grasp the other end with the pliers. Then firmly pull each knot as tight around the sleeving as possible.

( ) Position the ends of the nylon cord around the large sleeving and tie a double overhand (square) knot around the sleeving.

( ) Cut both ends of the nylon cord 1/4" from the knot. Then touch your hot soldering iron tip to each cord end and melt it down just to the knot.

Refer to Detail 3-4B for the following steps.

NOTE: In the following steps, you will prepare end B of the slide switch in the same manner that you prepared end A.

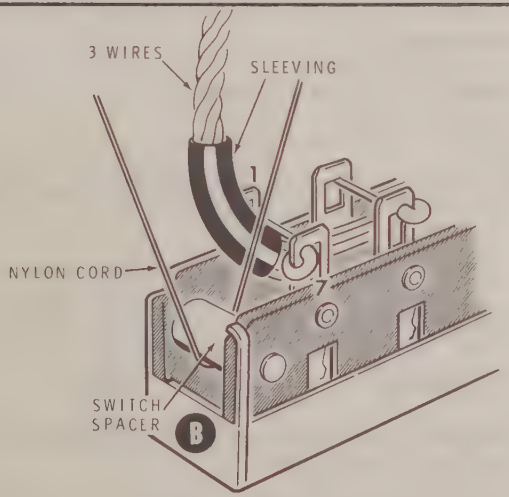
( ) Sharply fold the three wires at end B of the switch back over the switch lugs.

( ) Pass the ends of the other nylon cord upward through switch mounting hole B and around the switch spacer.

( ) Cut a 1/2" length of large, heat-shrinkable sleeving. Slide this sleeving over the ends of the three wires at end B of the switch and all the way down the wires until it is against lugs 1 and 7.

( ) Tie a double overhand (square) knot around the wires and the sleeving with the nylon cord. Pull each knot tight with pliers.

( ) Cut the nylon cord 1/4" from the knot. Then touch each cord end with the soldering iron and melt it down to the knot.



Detail 3-4B

NOTE: To perform the following step, you will need a source of heat to shrink the sleeving on the ends of the slide switch. Use a high wattage soldering iron tip, a heat gun, or even a kitchen match if you are extremely careful. No matter which method you prefer, use care to avoid a severe skin burn.

( ) Hold each end of the switch, in turn, close to a source of heat and slowly rotate it until the heat-shrinkable sleeving shrinks around the switch wires. NOTE: Be careful not to melt the nylon cord.

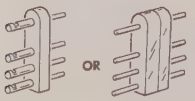
( ) At ends A and B of the switch, remove 1/8" of the insulation from each of the five unprepared wires. Tightly twist each wire end and add solder to hold the small strands together.

Connector Preparation

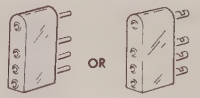
Refer to Pictorial 3-5 (fold-in) for the following steps.

( ) Cut five 1/2" lengths of small black sleeving.

( ) Locate the 4-pin plug and one 4-pin socket. These may appear as either type A or type B shown below.



TYPE A



TYPE B

If you received type A plug and socket, disregard the next step. If you received type B plug and socket, complete the next step.

( ) Cut the plug and socket pins to 3/16" as shown in Detail 3-5A.

DETAIL 3-5A

NOTE: In the following steps, install a length of black sleeving on each wire just before it is connected. Then, after all wires have been soldered to the socket or plug, slide the black sleeving over the connections. Position the 4-pin plug as shown. Note the wide space between pins 1 and 2. Connect the red, white, and black twisted wires from end B of the switch as follows:

( ) Red wire to pin 1 (S-1).

( ) White wire to pin 2 (S-1).

( ) Black wire to pin 4 (S-1).

( ) Twist the three wires tightly against the sleeving.

Refer to Pictorial 3-6 (fold-in) for the following steps.

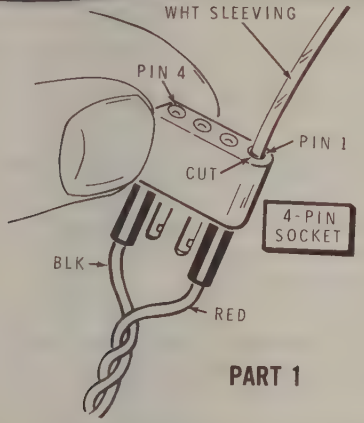
NOTE: In the following steps, install a 1/2" length of black sleeving on each wire just before you connect it. Then, after each wire is soldered, slide the sleeve down over the connection.

Position the 4-pin socket as shown. Note the wide space between pins 1 and 2. Connect the red and black wires as follows.

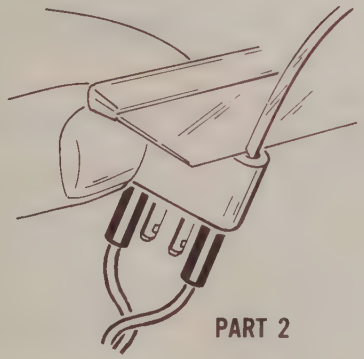
( ) Red wire to lug 1 (S-1).

( ) Black wire to lug 4 (S-1).

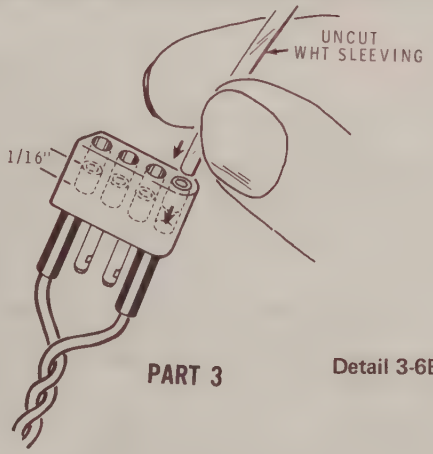
( ) Twist the red and black wires tightly against the sleeving.



PART 1



PART 2



PART 3

Detail 3-6B

NOTE: When you cut the white sleeving in the following steps, use a sharp cutting tool such as a single-edge razor blade or a modeling knife.

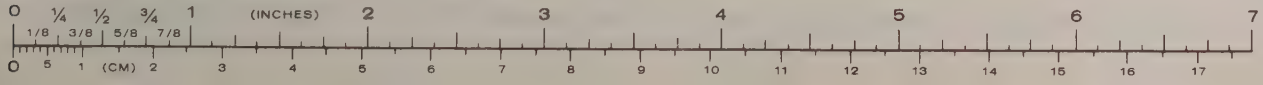
( ) Refer to Detail 3-6A and cut halfway through the white sleeving approximately 1/16" from the end as shown.

( ) Refer to Detail 3-6B and push this end of the white sleeving into the 4-pin socket opening on pin 1 as shown in Part 1. When the notch is flush with the end of the socket, cut the 1/16" end with a sharp tool as shown in Part 2. Then, use the uncut length of white sleeving and push the 1/16" piece as far as possible into the socket as shown in Part 3 of the Detail.

( ) In the same manner, cut and install a 1/16" length of sleeving into the socket opening at pin 4.

This completes the "Step-by-Step Assembly" of your Receiver Module.

If you are building an entire R/C System, proceed to the Instructions for the Receiver RF Module and assemble ALL the Receiver RF Modules.



TEST AND ALIGNMENT

If you do not obtain the proper results when you make the following test or alignment, turn off the Receiver and refer to the chart on Page 42. For the physical location of parts on the circuit boards, refer to the Circuit Board assembly steps, or to the Circuit Board X-Ray Views on Page 54.

NOTE: In the following steps, the battery for your Receiver must be fully charged if you are to obtain proper test results. Before you proceed, you should charge the battery, if necessary, as directed in the "Battery Charging" section of the Manual on Page 48.

RECEIVER TEST

In the following steps you will align the RF Module(s) for maximum sensitivity. Use the Transmitter for a signal source with the meter (removed from the Transmitter) as an indicator. NOTE: If you have a sensitive voltmeter, you may wish to use it rather than the Transmitter Meter. If this is the case, special notes will be made on each separate step where necessary. For example, "( ) Clip the red (positive) meter wire to Test Point 2. (VOLTMETER: Connect the positive voltmeter lead to Test Point 2.)"

Refer to Figures 4 (fold-out from Page 41) and 5 for the following steps.

( ) Plug the RF Module onto the Receiver Module.

( ) Turn the Receiver top-side-down as shown.

NOTE: In the following steps, keep the RF Module plugged into the Receiver. Do not remove the receiver circuit board from its case top.

( ) Remove the four screws from the bottom of the Receiver Module. Set the screws and the case bottom aside temporarily.

( ) Remove the screw from the RF Module; then carefully remove the case bottom. Gently slide the case top off the connectors without disconnecting the connectors from the Receiver Module.

( ) Locate the 15 kΩ, 1/4-watt (brown-green-orange) resistor left from the receiver assembly. Cut approximately 1/2" from either one of the resistor leads. The cut-off lead and the resistor will be used in the following steps.

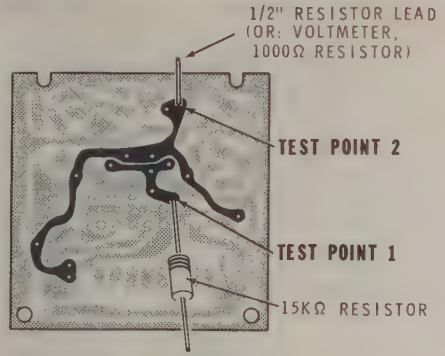


Figure 5

( ) Temporarily solder the 1/2" cutoff resistor lead to Test Point 2 on the foil of the receiver circuit board. (See Figure 5.) [VOLTMETER: Connect one lead of a 1000 Ω, 1/4-watt (brown-black-red) resistor (not supplied) to Test Point 2.]

( ) Carefully solder the shortened 15 kΩ resistor lead to Test Point 1 on the foil side of the receiver circuit board.

NOTE: You may wish to refer to the meter installation steps in your Transmitter Manual to best perform the following step.

( ) If necessary, temporarily disconnect the meter and meter leads from the Transmitter.

NOTE: In the following steps, you may use the test leads and alligator clips that were supplied with your Transmitter. As you connect these leads to the test points, be sure the alligator clips do not touch any other foils.

( ) Clip the black (negative) meter wire to the free end of the 15 kΩ resistor. (VOLTMETER: Connect the common, or negative, meter lead to the free end of the 15 kΩ resistor at TP1.)

( ) Clip the red (positive) meter wire to the 1/2" lead on Test Point 2. (VOLTMETER: Connect the positive meter lead to the free end of the 1000 Ω resistor at TP2.)

( ) Connect the battery switch to the Receiver as shown.

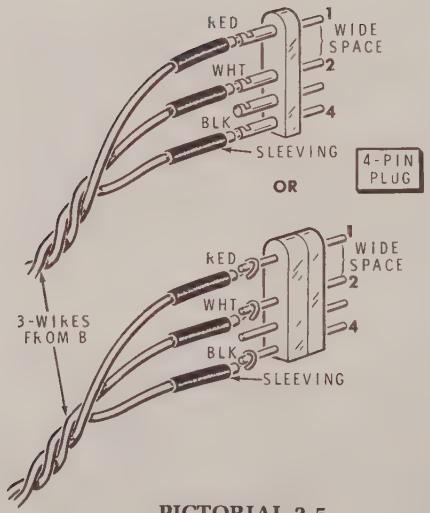
( ) Be sure the battery switch is in the off position as shown in Figure 4.

( ) Connect the battery to the battery switch.

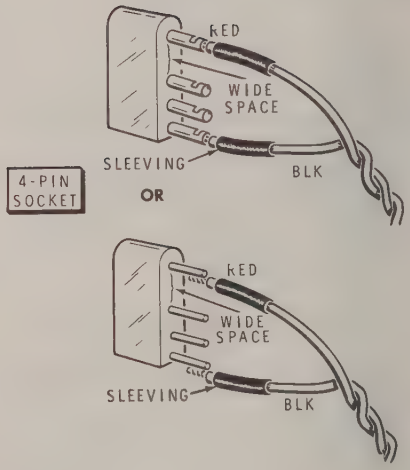
( ) Stretch the antenna (long white wire) of the Receiver out straight; keep it away from any metal objects.

NOTE: If you are using a voltmeter, turn it to a low range. In the following steps, if any problems arise, turn the battery switch off and refer to the "In Case of Difficulty" section of the Manual on Page 51.

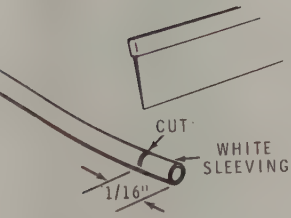
( ) Turn the battery switch on. The meter should deflect slightly. If the meter does not react in this manner, refer to the chart on the following page and investigate each of the possible causes until you find and correct your difficulty. Then continue on Page 43.



PICTORIAL 3-5



PICTORIAL 3-6



Detail 3-6A

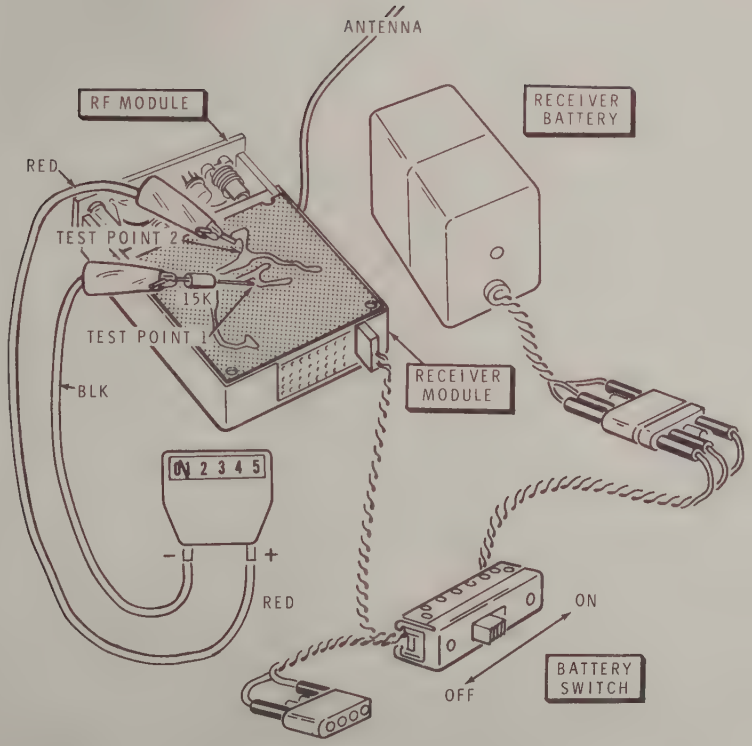
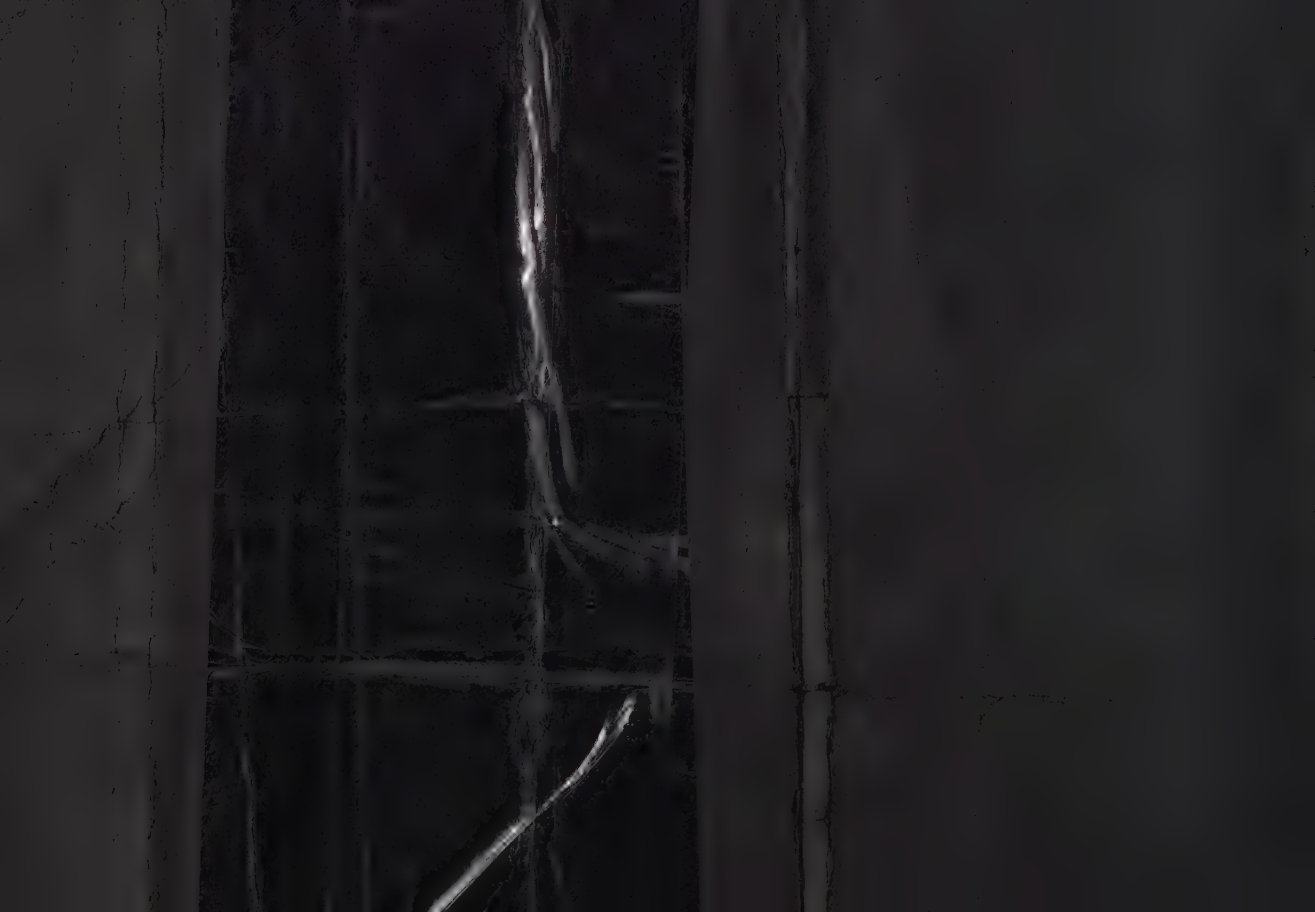
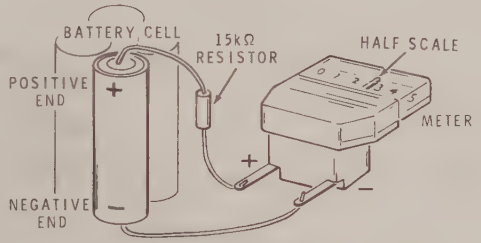


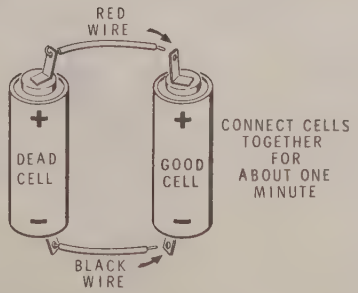
Figure 4



BATTERY CHECK

1. Unplug the Receiver battery from the Receiver.
2. Remove the battery from its case. Tape the ends of the battery leads to prevent accidental shorting.
3. Connect the 15 kΩ (brown-green-orange) resistor to the positive (+) meter lug and to the positive (+) battery terminal of any one cell.
4. Connect the negative (–) meter lug to the negative (–) battery terminal of the same cell. The meter should read half scale.
5. Repeat steps 3 and 4 for each of the remaining cells.
6. If the cell is dead, proceed as follows:
   - A. Disconnect all the interconnecting battery jumpers.
   - B. Mark the dead cell. Then remove the dead cell and also a good cell from the pack circuit.
   - C. Temporarily solder a short red wire to the positive (+) tab and a short black wire to the negative (–) tab of the dead battery.
   - D. Connect the dead cell in parallel (+ to +, and – to – as shown) with the good cell for about one minute. Then disconnect the cells and remove the red and black wires. If the cell that was dead will "take a charge," it should now read up-scale on the voltmeter.
   - E. If it does, refer to the Battery Pack instructions and reassemble the pack; then charge the batteries.
   - F. If the cell is still dead, procure a new cell for the pack and again charge the batteries as described on Page 48.





CONDITION	POSSIBLE CAUSE
Incorrect or no meter indication.	1. Weak battery (see "Battery Check" on fold-out from this page). This should not be the case at this time as the battery was just charged, unless the Charger is not operating properly. See the Receiver Battery charging instructions on Page 48. 2. Battery switch. 3. Transistors Q5 and Q8. 4. Diode D2. 5. Components associated with stages Q5 and Q8.

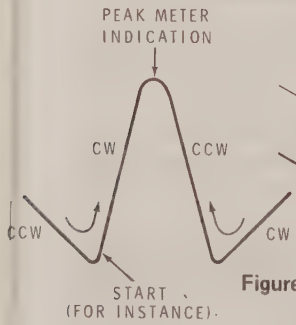


Figure 6

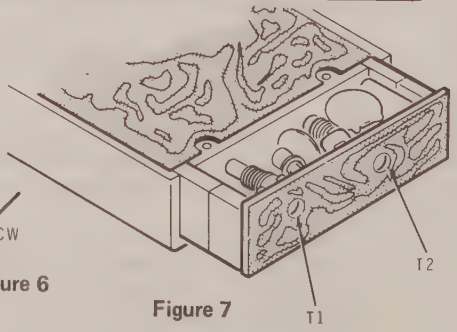
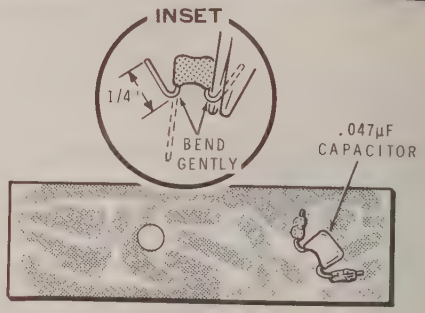


Figure 7



Detail 7A

RF MODULE ALIGNMENT

NOTE: As you perform the following steps, increase the distance between the Transmitter and the Receiver to keep the meter reading between 2 and 4. To do this, you may have to place your Transmitter in some sort of metal container. Do not touch the Receiver or any of its leads as you make the following adjustments. Tape the Receiver to a nonmetallic surface to hold it securely in place. Do not use any metallic tape. Use the plastic alignment tool to make all adjustments.

( ) If you checked the batteries, reconnect the meter and the 15 kΩ resistor as shown in Figure 4 on fold-out from Page 41.

( ) Place the matching frequency module into the Transmitter. Be sure the frequency agrees with the frequency of the Receiver RF Module.

( ) Stretch the antenna (white wire of the Receiver) out straight, keeping it away from any metal objects.

( ) Turn the Receiver switch ON.

( ) Turn the Transmitter ON and move it to a location where the meter gives an indication of approximately 3.

NOTE: Use the screwdriver end of the alignment tool for the following steps. Do not turn either transformer slug more than one turn in either direction.

CONDITION	POSSIBLE CAUSE
Meter pointer does not move upscale when the Transmitter is turned on.	1. Incorrect RF module in Transmitter. 2. Transistors Q1 through Q5. 3. Components associated with transistors Q1 through Q5. 4. Transformers T1 and T2.

IMPORTANT: As you make the following adjustments, the meter indication may move upscale, whether you turn the slug clockwise or counterclockwise. It is very important that you detect a definite signal peak within the maximum one turn allowance. If, at first, you do not see this peak on the Meter, return the coil slug to its starting point, and then turn it in the opposite direction. See Figure 6.

Refer to Figure 7 for the following steps.

NOTE: As you make the following adjustments, you may have to increase the distance between the Transmitter and Receiver to keep the meter reading near half-scale.

( ) Adjust transformer T1 for a maximum indication on the meter.

( ) Adjust transformer T2 for a maximum indication on the meter.

( ) Repeat the previous two steps until no further improvement can be made.

( ) Turn both the Receiver and the Transmitter off.

NOTE: If you received an extra .047 µF ceramic capacitor with your RF module, install it in the following steps (FOR THE 53 MHz AND 72 MHz BANDS ONLY).

Refer to Detail 7A for the next two steps.

( ) Cut both leads of the capacitor to 1/4". Then, with long-nose pliers, gently bend the leads as shown in the inset drawing.

( ) Solder the leads to the indicated foils. Make sure the leads do not touch any other foils. Then press the capacitor down flat against the circuit board.

( ) Carefully reinstall the RF Module into its case and secure the case parts together with the screw you previously removed.

NOTE: If you have ordered additional RF Modules for your Transmitter and Receiver, adjust each Receiver RF Module to the appropriate Transmitter module in turn. To do this, refer to "RF Module Alignment," above, and proceed to this point. Be sure to always use the RF Modules in matched-frequency pairs. If optimum range is desired, repeat the "RF Module Alignment" with all the servos connected to the Receiver and installed in the plane.

( ) Unclip both meter leads from the Receiver Module.

( ) Unsolder the 15 kΩ resistor and the 1/2" wire (or the 1000 Ω resistor) from the Receiver circuit board foils.

( ) Carefully reinstall the Receiver Module into its case with the four screws previously removed.

DECODER TEST

Refer to Figure 8 (fold-out from Page 47) for the following steps.

( ) Plug in the RF Module.

( ) Connect the Receiver components as shown.

( ) Connect the black (negative) meter wire or voltmeter lead to the black wire in the battery connector. Pull the sleeving back to expose the connector.

( ) Connect the red (positive) meter wire or voltmeter lead to one end of a 15 kΩ (brown-green-orange) resistor.

( ) Turn the Receiver and the Transmitter on.

( ) Touch the free end of the resistor to the Channel #1 output as shown. Operate the Channel #1 stick on the Transmitter. As you move the stick one way, the meter pointer should deflect slightly. As you move the stick in the opposite direction, the meter pointer should deflect opposite to the original direction. When you return the stick to the center position, the pointer should return to its original "at rest" position.

CONDITION	POSSIBLE CAUSE
No meter indication, or meter indication does not change when you move the Channel #1 control.	1. Transistors Q6 or Q7. 2. Integrated circuit IC1. 3. Diode D3.

( ) Touch the resistor lead to the Channel #2 output and operate the Channel #2 control on the Transmitter. Repeat this procedure for all other operating channels.

NOTE: When you perform the Decoder Test with 5-Channel transmitters, Channel #6 output will also indicate an output on the meter. Channels 7 and 8 will indicate zero.

CONDITION	POSSIBLE CAUSE
No meter indication, or meter indication does not change when you move the Channel control.	1. Integrated circuit IC1.

( ) Turn off the Transmitter and Receiver, and disconnect the meter leads.

This completes the "Test and Alignment" section of the Receiver.

If you are building a complete R/C System, refer to your Servo Assembly Manual and assemble ALL the Servos.

INSTALLATION

The Model GDA-1205-2 Receiver can be used in model cars and boats as well as in model airplanes. But since the eight channels (maximum capability) of this system are ideal for use in model airplanes, only this type of installation will be described. These same installation principles also apply to other types of models. The main points for you to consider in your installation are: weight distribution, protection from mechanical shock, vibration, dirt, and oil.

Figure 9 (fold-out from Page 47) shows a typical model airplane installation. Compare this Figure with your plane very carefully to determine the best location for the Receiver, Servo units, and Battery. Temporarily set the components in the chosen places to be sure they will fit. Remember, too, that because your Receiver RF Module is interchangeable, you may wish to have easy access to it. Select the location for the Receiver with this in mind. After you have decided on the most suitable locations for all components, remove them from the plane and then install them one at a time.

The following instructions cover the most important considerations for the installation of each component.

BATTERY

The Battery should be wrapped in at least 1/2" of soft foam material and installed forward of a strong bulkhead, ahead of the Receiver. A battery compartment can be made by installing another bulkhead in front of the Battery. Be sure the Battery cannot shift, and that it does not interfere with any pushrod movement. A loose Battery can shift due to vibration and break off the battery leads.

BATTERY SWITCH

Select a location for mounting the switch in the side of the fuselage that is away from the engine exhaust. This will keep exhaust oil and fumes from fouling the switch contacts. Cut a 1/4" x 3/8" opening in the fuselage to clear the switch slide; then mount the switch and switch plate with the two 3-48 x 1/4" screws. NOTE: Use the opening in the center of the switch plate as a template to mark the fuselage cutout.

NOTE: When you connect the battery switch to the Receiver and Battery, note the polarization of the plugs.

For further information on the battery switch, refer to "Battery Charging" on Page 48.

RECEIVER AND ANTENNA

Although the Receiver is very rugged, it should be well protected in case the plane should crash. Wrap the Receiver in thick, soft foam material. Then install the Receiver behind a strong bulkhead. Be sure the Receiver and Battery do not interfere with any pushrod movement. POSITION THE ANTENNA WIRE AWAY FROM METAL PUSHRODS, SERVOS, AND SERVO WIRES, OR THE OPERATING RANGE CAN BE SEVERELY REDUCED.

Tie a single knot in the antenna wire at a point that will permit a looseness between the Receiver and the antenna hole in the fuselage. Then pass the antenna wire through the hole and pull it toward the tail of the plane. Tie a rubber band to the end of the antenna wire; then fasten the rubber band to the tail fin. CAUTION: Do not shorten the length of the antenna wire. Any change in the antenna length will detune the Receiver and reduce its operating range. If your system will be operated on either the 53 or 72 MHz bands, the antenna may be shortened as much as 6" without affecting the performance of the system. Keep the antenna wire away from the receiver case and metal parts.

NOTE: If your plane was sprayed with metallic paint, be sure to keep the antenna away from the plane's surface or the operating range may be severely reduced.

AILERON EXTENDER CABLE

The aileron extender cable shown in Figure 10 is for use in an airplane that features a removable wing. Connect one end of the cable to the Receiver. Then when the Receiver is wrapped in padding, you can connect the Receiver to the Servo by using the extender cable.

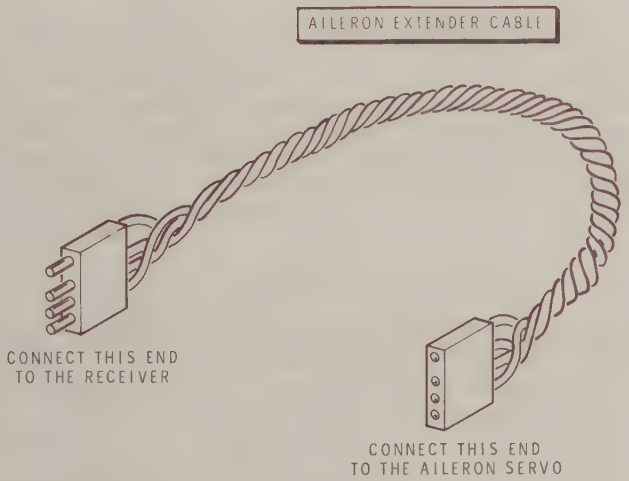


Figure 10

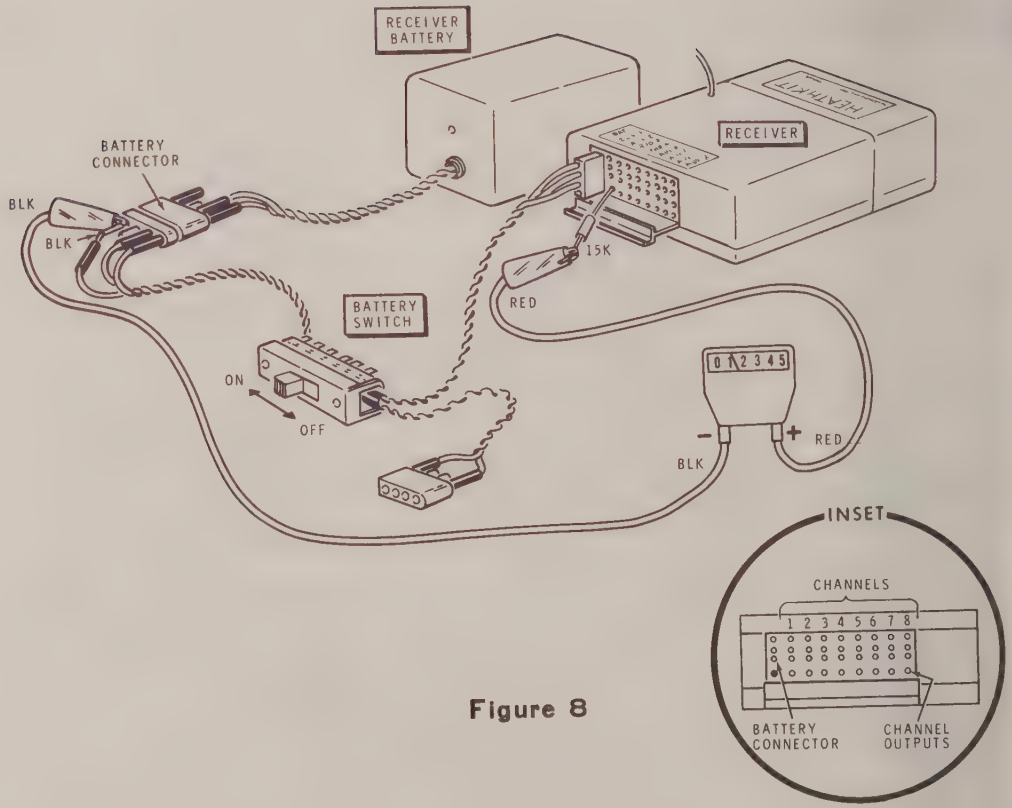

RECEIVER BATTERY
RECEIVER
HEATHKIT
BATTERY CONNECTOR
BLK
BLK
15K
RED
BATTERY SWITCH
ON
OFF
0 1 2 3 4 5
BLK
RED
INSET
CHANNELS
1 2 3 4 5 6 7 8
BATTERY CONNECTOR
CHANNEL OUTPUTS

Figure 8

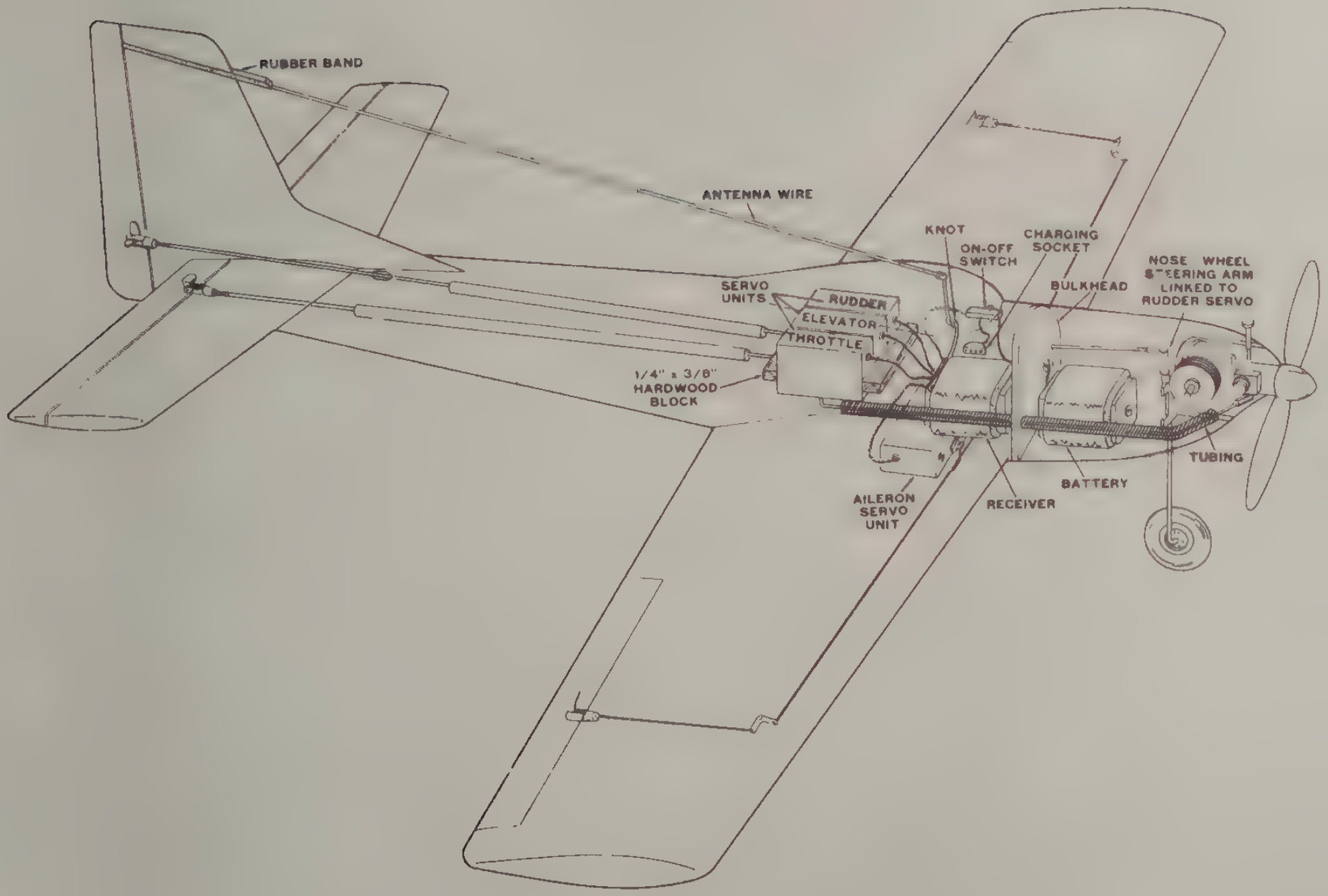

RUBBER BAND
ANTENNA WIRE
KNOT
ON-OFF SWITCH
CHARGING SOCKET
NOSE WHEEL STEERING ARM LINKED TO RUDDER SERVO
BULKHEAD
SERVO UNITS
RUDDER
ELEVATOR
THROTTLE
1/4" x 3/8" HARDWOOD BLOCK
TUBING
BATTERY
RECEIVER
AILERON SERVO UNIT

Figure 9

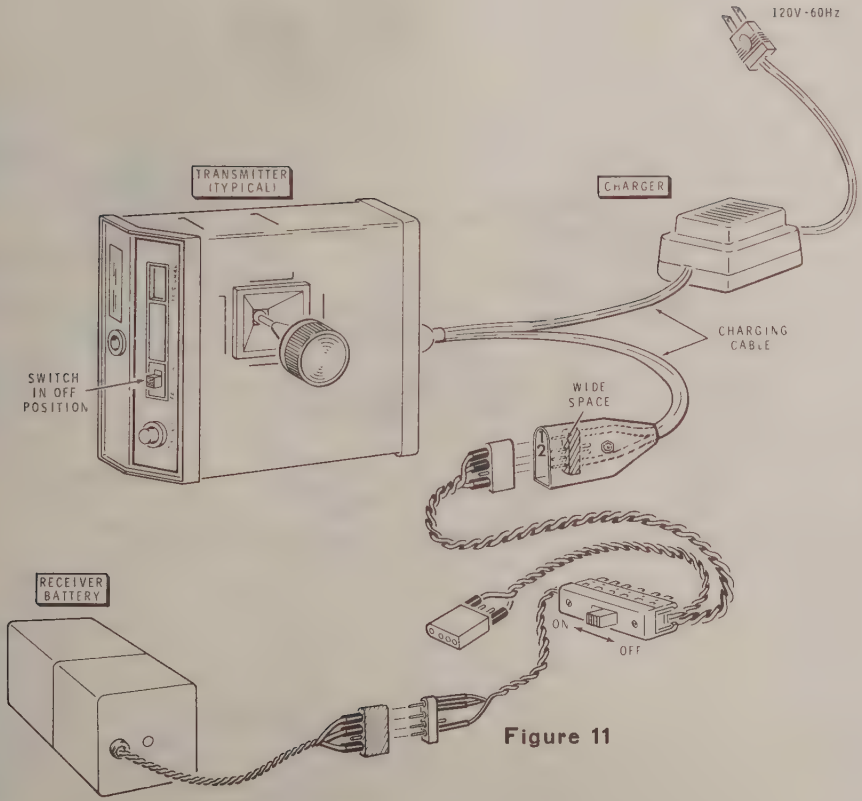

120V-60Hz
TRANSMITTER (TYPICAL)
CHARGER
CHARGING CABLE
SWITCH IN OFF POSITION
WIDE SPACE
RECEIVER BATTERY
ON
OFF

Figure 11

BATTERY CHARGING

To charge the Receiver Battery, use the Charger and the Transmitter. By using the battery switch circuit, you can charge the Receiver Battery without removing it from the model or disconnecting it from the Receiver. The recommended way to charge the transmitter and receiver batteries is to use the Charger and charge the batteries from 14 to 24 hours. (More than 24 hours will not add to the battery charge.) The transmitter and receiver batteries must be charged at the same time or the charging circuit will not work. However, if the Receiver Battery is charged on a separate charger, charge it at a rate of 50 mA for 14 hours.

Refer to Figure 11 (fold-out from this page) for the following steps.

After you have installed your Receiver and Battery in the airplane (or other kit), charge your Receiver Battery in the following manner:

A. Connect the Transmitter charging cable to the charging connector on the battery switch in the model.

B. Make sure the Transmitter and the Receiver battery switches are turned off.

C. Connect the charging cable from the Charger to the Transmitter.

D. Plug the Charger line cord into a 120-volt AC outlet. The pilot lamp in the Charger will indicate that both batteries are charging.

NOTE: Both the Receiver Battery and the Transmitter on-off switches must be in the OFF position to charge the batteries.

E. At the end of the charging cycle, remove the Charger line cord from the AC outlet. Remove the charging cables from the model charging plug and from the Transmitter. Set the Charger aside.

SPECIFICATIONS

Carrier Frequency	One of the following, crystal-controlled:

27 MHz Band	53 MHz Band	72 MHz Band
26.995 MHz	53.100 MHz	72.080 MHz
27.045 MHz	53.200 MHz	72.160 MHz
27.095 MHz	53.300 MHz	72.240 MHz
27.145 MHz	53.400 MHz	72.320 MHz
27.195 MHz	53.500 MHz	72.400 MHz
		72.960 MHz
		75.640 MHz

equency Stability	.003% on 27 MHz band. .002% on 53 MHz and 72 MHz bands.
mperature Range	0 to 160 degrees F.
nsitivity	5 μV or less.
lectivity	6 dB down at ±4 kHz. 30 dB down at ±9 kHz.
rrent Drain	6 mA typical; 8 mA maximum.
termediate Frequency	453 kHz.

Power Supply	4.8 V, Battery Pack GDA-1205-3.
Control	ON-OFF switch.
Dimensions	
RF Module	1-3/4" wide x 5/8" high x 3/4" deep (4.45 cm x 1.59 cm x 1.91 cm).
Receiver Module	1-3/4" wide x 5/8" high x 1-3/4" deep (4.45 cm x 1.59 cm x 4.45 cm).
Net Receiver Weight	2 oz. (62.2 gm.).
Total Flying Time	3 hours fully charged (4 servos).

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

IN CASE OF DIFFICULTY

This part of the Manual is divided into two sections: "Finding the Area of Trouble" and "General Tests." When necessary, refer to other parts of the Manual. For example, you may wish to refer to the Block Diagram, "X-Ray Views," and parts of the "Step-by-Step Assembly" section for help in locating parts and wires. If you have a knowledge of electronics, you will also find additional valuable information in the "Circuit Discription" and Schematic Diagram. All voltages were taken with a high-impedance input voltmeter.

FINDING THE AREA OF TROUBLE

When trouble develops, the first indication usually is that one or more of the Servos do not respond to the movement of the Transmitter controls.

Before you suspect a faulty piece of equipment, first be sure that the batteries have a sufficient charge to provide proper operation. When the transmitter is turned on with the antenna extended and the meter indication is below 3, the transmitter battery is weak and should be recharged.

The batteries can also be checked with a voltmeter. To get an accurate check, however, the batteries must be tested under load. That is, with the battery connected and the equipment turned on.

If a Servo stops operating, unplug the faulty Servo from the Receiver and plug another Servo, one known to be operating properly, into the same connector. If this Servo fails to operate, you can assume that the first Servo is all right and that the trouble is in the Receiver or Transmitter. In a condition where all of the Servos failed at the same time, you should suspect the Receiver Battery, the Receiver, or the Transmitter.

If a Servo is faulty, refer to the "In Case of Difficulty" section in the Servo Manual.

If only one Receiver channel is faulty, it is more than likely that the trouble is in the decoder integrated circuit or in the Transmitter. If all Receiver channels are faulty, the trouble is likely to be in the remaining circuits. Refer to the "Test and Alignment" section on Page 40 to further isolate the problem.

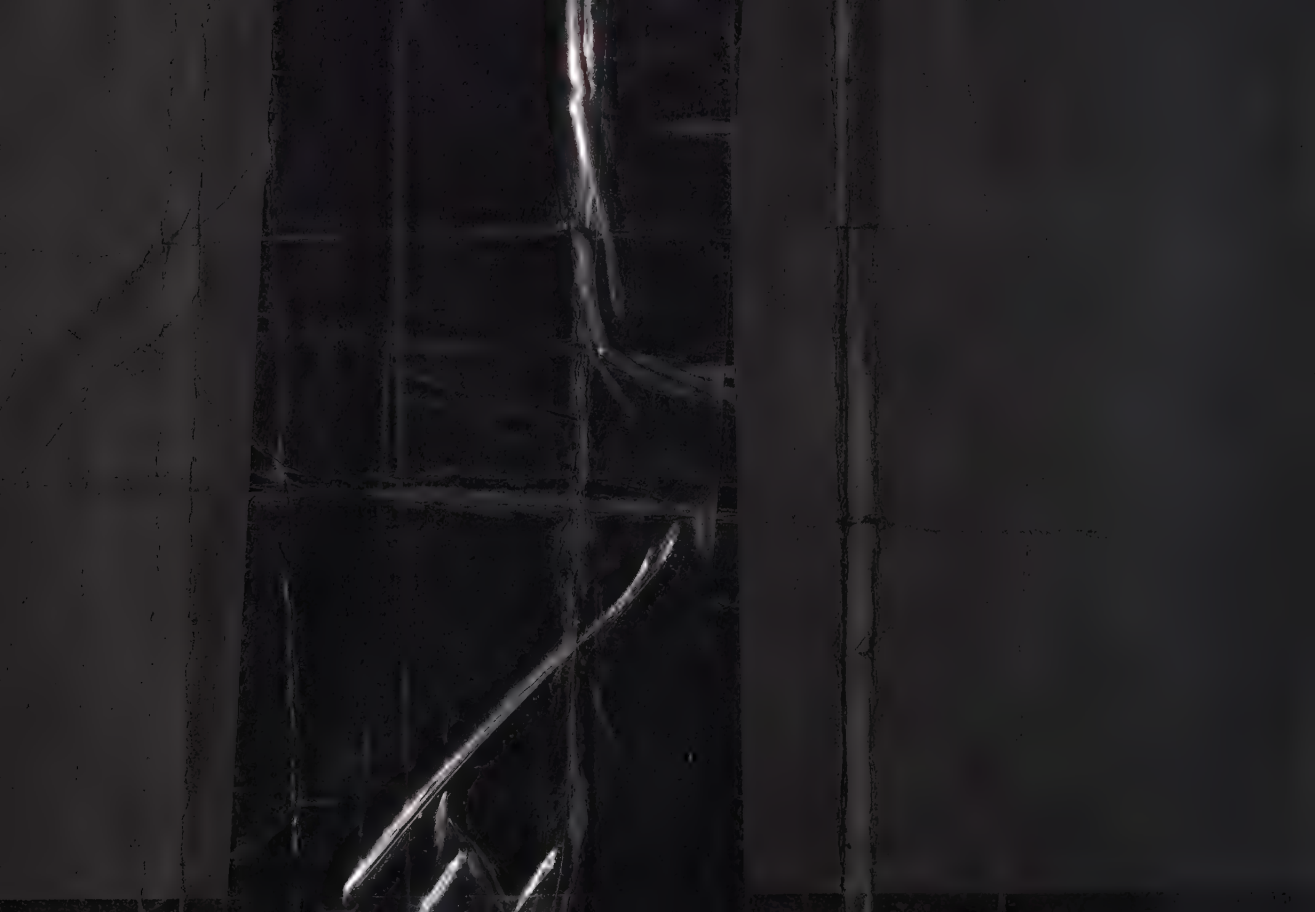
If a Transmitter is faulty, refer to the "In Case of Difficulty" section in the Transmitter Manual.

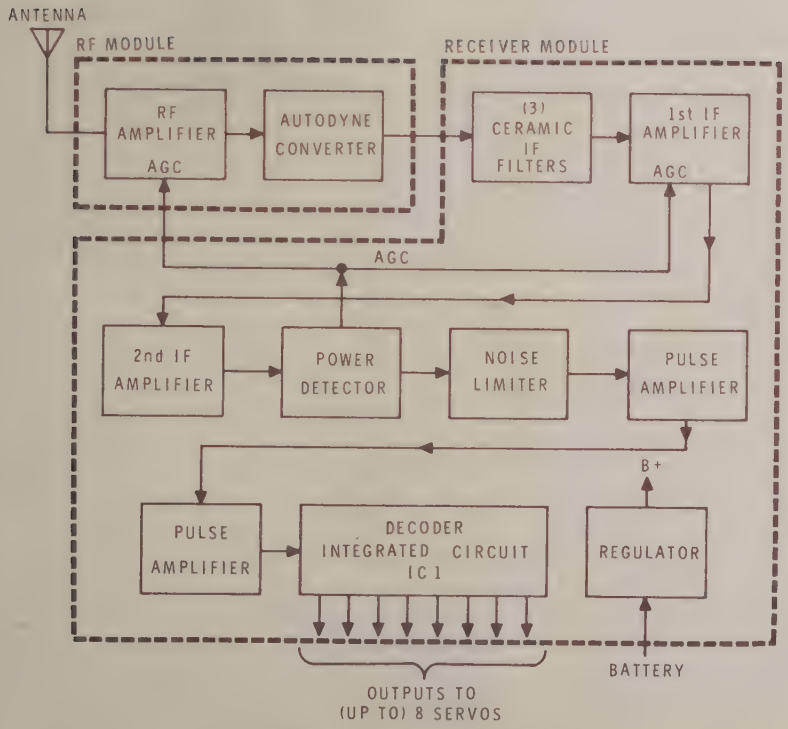
GENERAL TESTS

1. Recheck the wiring. It is frequently helpful to have a friend check your work. Someone who is not familiar with the unit may notice something consistently overlooked by the builder.

2. About 90% of the kits that are returned for repair do not function properly due to poor connections and soldering. Therefore, many troubles can be eliminated by checking all connections to make sure that they are soldered correctly as described in the Soldering section of the "Kit Builders Guide," and in the "Assembly Instructions" in the front of this Manual. Reheat the connections as necessary, but be careful not to create any solder bridges.

3. Check the values of all the parts. Be sure that the proper part has been installed at each location on the circuit boards. Even experienced builders admit this is a common error.





BLOCK DIAGRAM

4. Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring or adhering to the circuit board foils.

5. Check very carefully (with a magnifier, if possible) to be sure there are no solder bridges between circuit board foils. Refer to Pictorials 1-14 and 1-15 on Pages 27 and 28.

6. If, after careful checks, the trouble is still not located and a voltmeter is available, check voltage readings in the circuits of the unit that you are having trouble with against those shown on the "Circuit Board Voltage Chart," and Schematic Diagram.

7. A review of the "Circuit Description" and Schematic may also help you to locate any difficulties in the kit.

NOTE: In an extreme case where you are unable to resolve a difficulty, refer to the "Customer Service" information inside the rear cover of the Manual.

CIRCUIT DESCRIPTION

Refer to the Block Diagram on fold-out from Page 52 and to the Schematic Diagram (fold-out from Page 59) as you read this Circuit Description.

The AM superheterodyne Receiver has a tuneable, double-tuned front end with an RF amplifier and an autodyne converter in a separate plug-in RF Module package. The Receiver Module includes three ceramic filters and two transistor IF amplifiers. A power detector provides detection and the required AGC voltage for the RF and first IF amplifiers. The detected signal then passes through a noise limiter and two pulse amplifiers to the IC decoder. This part of the circuit operates as a shift register with a serial input and parallel outputs for eight channels of simultaneous control.

RF MODULE

The transmitted RF signal is picked up at the antenna and fed to the tuned circuit of transformer T1 and capacitor C1. T1 and C1 are tuned to the transmitted signal frequency. Diode D1 is used to limit strong signals and prevent overloading of the RF stage.

From the secondary of T1, the signal is coupled to the base of RF amplifier transistor Q1. The amplified signal from Q1 is applied to the tuned circuit of capacitor C2 and Transformer T2, which are also tuned to the transmitter signal frequency. T2 is tapped to provide an impedance match to the collector of Q1. From the secondary of T2, the signal is coupled to the emitter of autodyne converter transistor Q2.

egenerative feedback through the receiver crystal causes the autodyne onverter circuit to oscillate at the crystal's fundamental frequency on the 27 IHz band, or at its second harmonic on the 53 and 72 MHz bands. The input gnal and the oscillator signal beat together in transistor Q2 to produce a 453 Hz difference signal that is passed through the module connector and into coil .1 in the Receiver Module.

RECEIVER MODULE

The 453 kHz difference signal from the RF Module is applied to coil L1. From L1, the signal passes through resistor R3 to the first ceramic (IF) filter (CF1). Capacitor C5 (in the RF Module) tunes with L1, near the crystal oscillator requency.

Each ceramic filter contains an input and output filter. As the IF signal is applied to the input, it resonates at the IF frequency and passes the vibrations to the output, causing it to resonate at the same frequency. The ceramic IF filters will resonate at and pass only the frequency to which they are tuned, in this case, the 453 kHz IF frequency.

The IF signal is coupled through CF1, CF2, CF3, and resistor R12 to the base of first IF amplifier transistor Q3. The amplified IF signal from Q3 is further amplified by second IF transistor Q4 and coupled through capacitor C14 to the base of power detector, Q5. Diode D2 is forward biased by resistor R18 so that .5 volt is applied to the base of Q5 through coil L3, which will hold Q5 at cut off. Since Q5 requires about .6 volt at its base to conduct, the additional .1 volt is supplied by the positive portion of the IF signal. Thus, transistor Q5 conducts only on the positive peaks of the IF signal.

When it receives an IF signal, Q5 conducts. Then, when a transmitted pulse is received, which temporarily stops the IF carrier, there is no IF signal to make Q5 conduct. Therefore, Q5's collector voltage rises. This then produces a positive pulse from Q5 that is equivalent to the pulses in the Transmitter.

Capacitor C15 bypasses the IF frequency and leaves a train of audio frequency pulses that are coupled through diode D3, resistor R22, and capacitor C17 to the base of pulse amplifier transistor Q6. Diode D3 and resistors R21 and R23 eliminate noise pulses under strong signal conditions, and integrator network resistor R22 and capacitor C16 prevent noise from interfering under weak signal conditions.

An automatic gain control (AGC) circuit that consists of resistors R17, R13, R8, and R7, with capacitors C12 and C7, feeds back part of the Q5 collector voltage to the base circuits of transistors Q1 and A3. The stronger the receiver signal, the more transistor Q5 conducts and lowers the voltage of its collector. This voltage is applied through resistors R17, R13, R8, and R7 to reduce the gain of Q1, Q3, and Q4. This AGC action prevents the IF amplifier and detector circuits from overloading and producing improper pulses when strong signals are received.

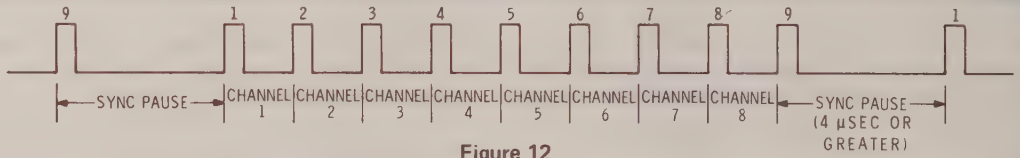


Figure 12

The output from transistor Q5 is a series of positive pulses that are spaced like the modulation pulses of the Transmitter. See the waveform in Figure 12.

Decoder Circuits

Pulse amplifier transistors Q6 and Q7 further increase the amplitude of the pulses from Q5. Q6 and Q7 are normally cut off until the pulses reach a high enough amplitude to turn them on and thus provide further noise immunity and produce clear, sharp pulses at the collector of Q7.

The signal pulses from the collector of Q7 are coupled to input pin 4 of decoder integrated circuit IC1.

Integrated circuit IC1 consists mostly of a 10-stage shift register counter. Assume the decoder starts out at rest. As soon as the first pulse of a frame begins, the counter advances one step and begins supplying a voltage pulse at the channel 1 servo connector. When the next pulse arrives at the input, the counter advances one step, terminates the pulse at channel 1, and begins a new pulse at channel 2. Each pulse at the servo inputs are therefore dependent on the spacing of the pulses in the pulse train arriving at the input of IC1. This process then continues through all eight channels. Pin 2 of IC1 is the reset terminal. Pin 2 is connected to an RC network whose time constant is set to detect the sync pulse. As each input pulse from Q7 arrives, IC1 charges capacitor C22. If the pulse spacing is approximately 4 microseconds or greater, as is the case during sync pause time, the voltage will discharge through resistor R31. This voltage will discharge to a low enough value to reset IC1 and prepare it to decode a new frame.

Transistor Q8 is used as a regulator to decouple the receiver and decoder pulse amplifiers from the battery and servos. This eliminates any rapid fluctuations in battery voltage from upsetting the pulse widths at the servo outputs.

CIRCUIT BOARD X-RAY VIEWS

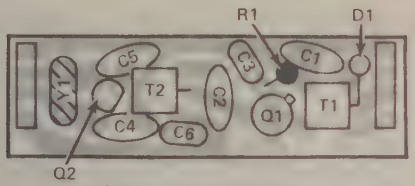
NOTE: To find the PART NUMBER of a component for the purpose of ordering a replacement part:

A. Find the circuit component number (R5, C3, etc.) on the "X-Ray View" or "Chassis Photograph."

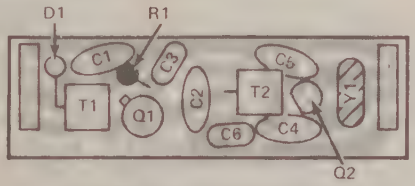
B. Locate this same number in the "Circuit Component Number" column of the "Parts List" in the front of this Manual.

C. Adjacent to the circuit component number, you will find the PART NUMBER and DESCRIPTION which must be supplied when you order a replacement part.

RF CIRCUIT BOARD

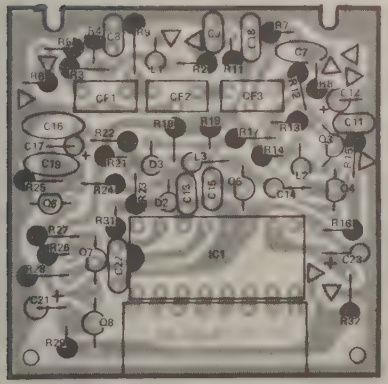


(Shown from foil side)

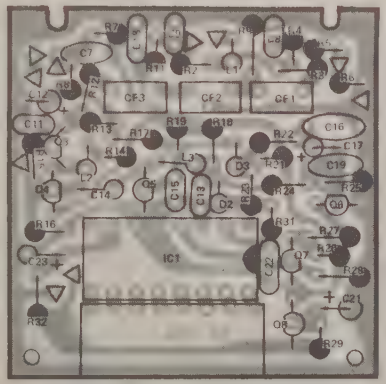


(Shown from component side)

RECEIVER CIRCUIT BOARD



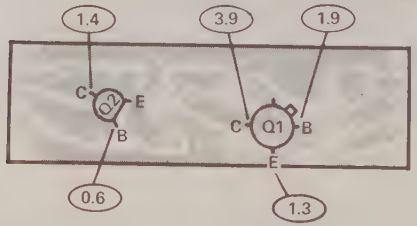
(Shown from foil side)



(Shown from component side)

CIRCUIT BOARD VOLTAGE CHARTS

RF CIRCUIT BOARD



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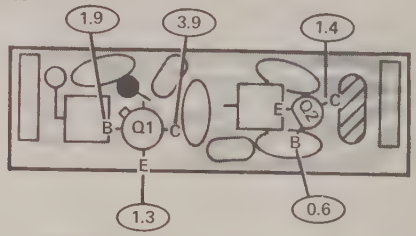
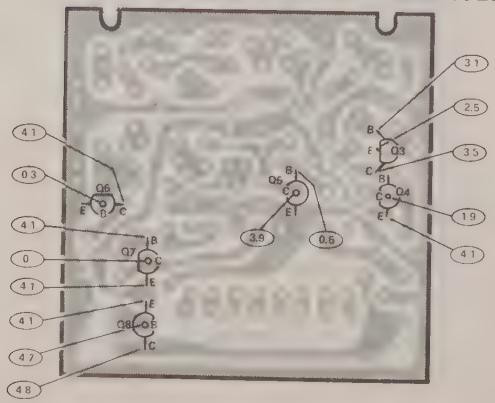


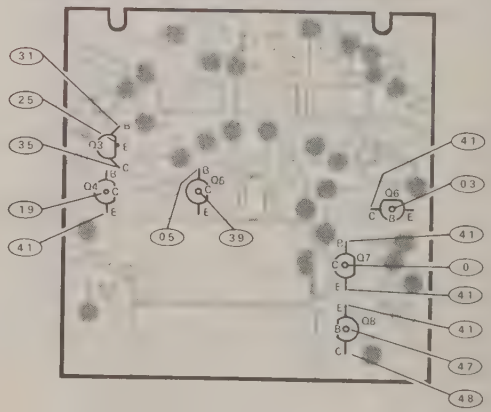
(Shown from component side)

(Shown from foil side)

RECEIVER CIRCUIT BOARD

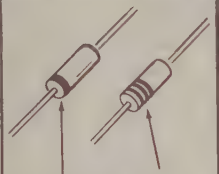
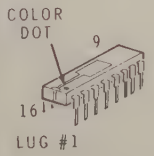
(Shown from component side)



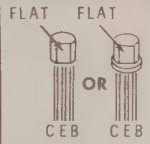
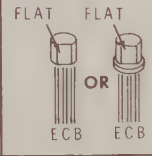


IDENTIFICATION CHARTS

ode

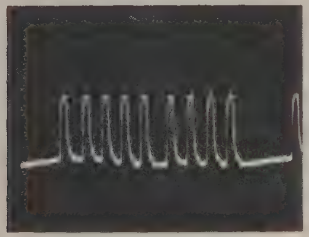
COMPONENT	HEATH PART NO.	MAY BE REPLACED WITH	IDENTIFICATION
D1	56-56	1N4149	
D2, D3,	56-84	1N4148	
ntegrated ircuit (IC)			
IC1	443-689	SCUS0127	

Transistors

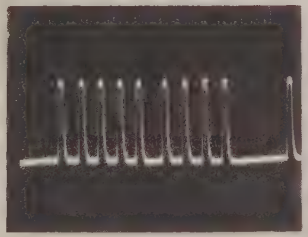
COMPONENT	HEATH PART NO.	MAY BE REFLACED WITH	IDENTIFICATION
Q3	417-258	TIS87	
Q5	417-91	2N5232A	
Q2	417-164	16G2349	
Q4, Q7	417-201	X29A829	
Q6, Q8	417-801	MPSA20	
Q1	417-228	SE5055	

ALTERNATE FREQUENCIES AND PARTS

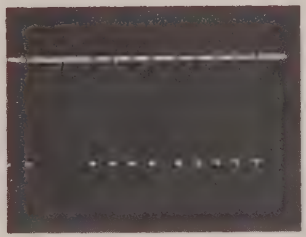
FREQUENCY BAND	TRANSMITTER FREQUENCY	RECEIVER CRYSTAL		RESISTOR VALUE	CAPACITOR VALUE				PART NO. TRANSFORMER	
		FREQUENCY	PART NO.	R1	C1	C2	C5	C10	T1	T2
27 MHz	26.995 MHz	26.542 MHz	404-384	1500Ω	47pF	47pF	75pF		40-913	40-914
	27.045 MHz	26.592 MHz	404 385							
	27.095 MHz	26.642 MHz	404 386							
	27.145 MHz	26.692 MHz	404-387							
	27.195 MHz	26.742 MHz	404 388							
53 MHz	53.100 MHz	26.3235 MHz	404-389	2700Ω	27pF	27pF	47pF	.047	40-915	40-916
	53.200 MHz	26.3735 MHz	404-390							
	53.300 MHz	26.4235 MHz	404 391							
	53.400 MHz	26.4735 MHz	404-392							
	53.500 MHz	26.5235 MHz	404 393							
72 MHz	72.080 MHz	36.2665 MHz	404-394	1000Ω	27pF	27pF	47pF	.047	40-917	40-918
	72.160 MHz	36.3065 MHZ	404-560							
	72.240 MHz	36.3465 MHz	404-395							
	72.320 MHz	36.3856 MHz	404-561							
	72.400 MHz	36.4265 MHz	404-396							
	72.960 MHz	36.7065 MHZ	404-397							
	75.640 MHz	37.5935 MHz	404-398							



1 COLLECTOR Q5
.5 – 2.0V p-p



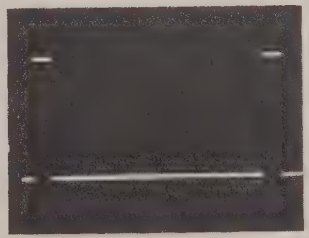
2 BASE OF Q6
0.4V p-p



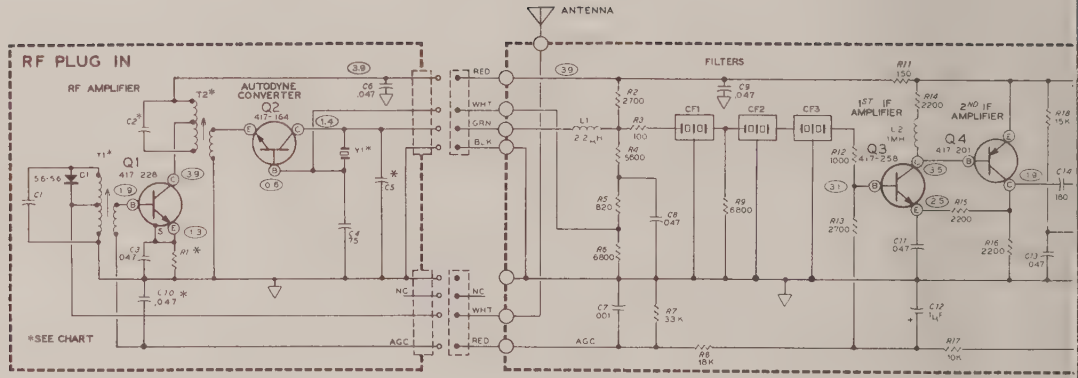
3 COLLECTOR Q6
4.0V p-p

4 COLLECTOR Q7
4.0V p-p

5 PIN 2 IC101



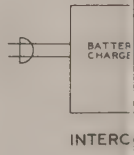
6 IC OUTPUT PINS 9-16
(with servo connected)
4.8V p-p

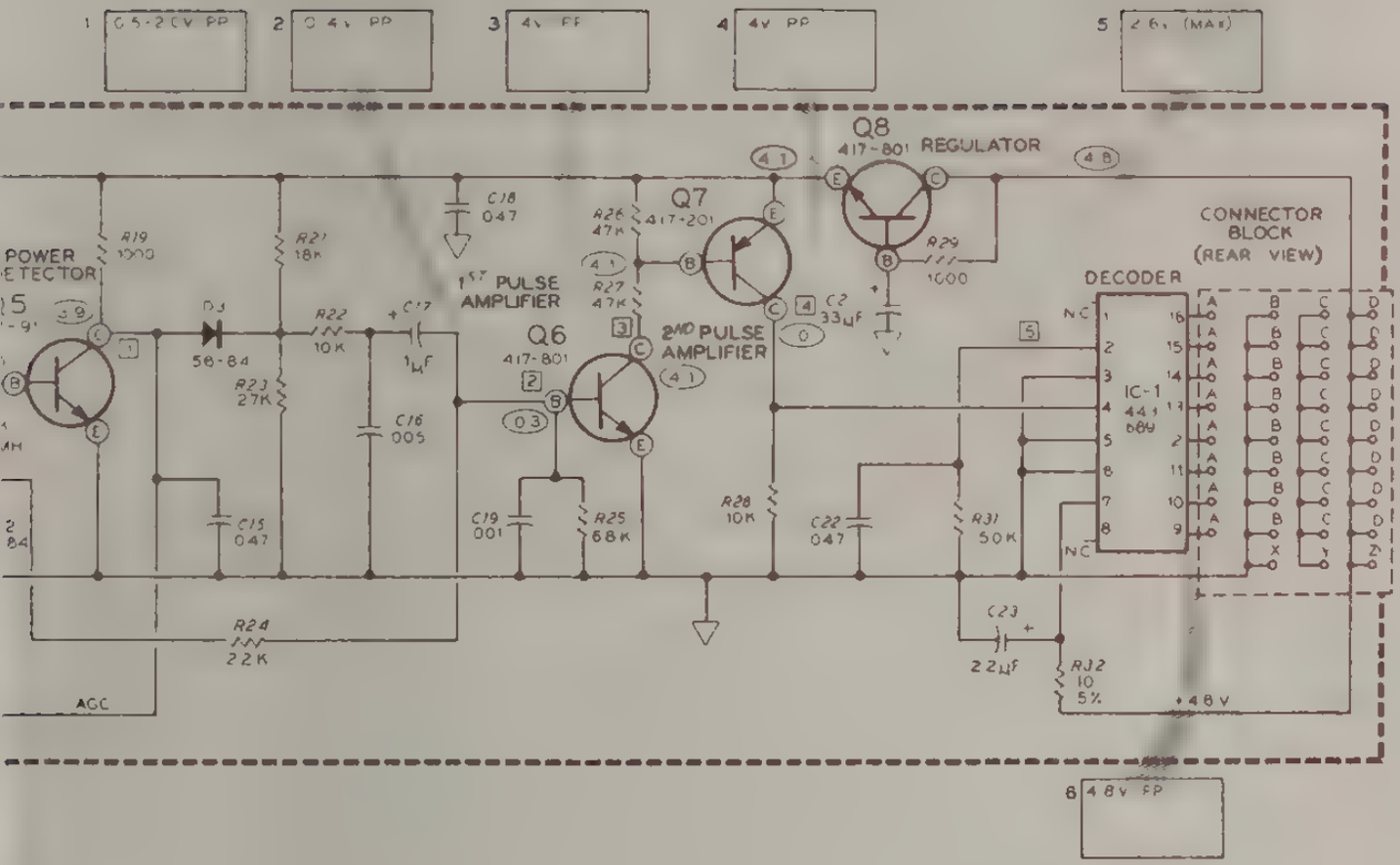


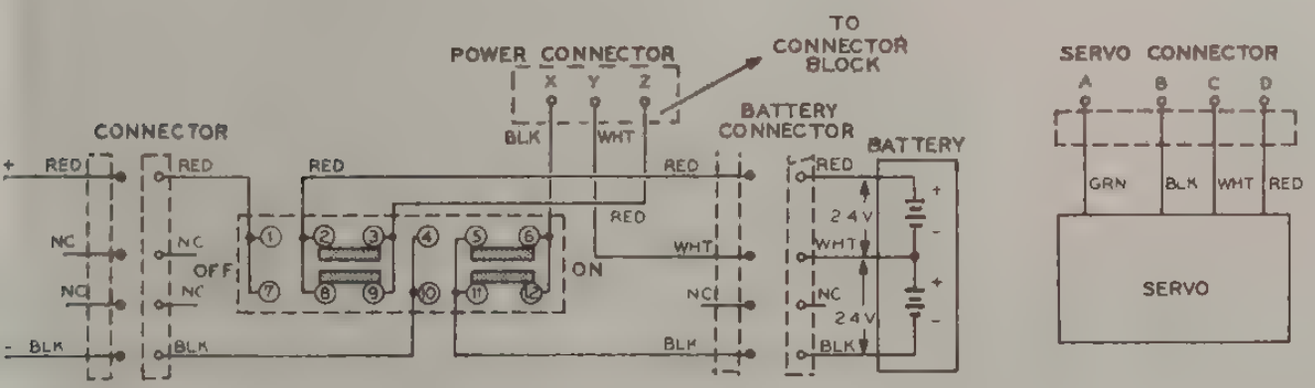
SCHEMATIC OF THE HEATHKIT® MODEL GDA-1205-2 8-CHANNEL MODULAR R/C RECEIVER

NOTES:

1. ALL RESISTORS ARE 1/4-WATT UNLESS OTHERWISE MARKED (k = 1000).
2. CAPACITOR VALUES LESS THAN 1 ARE IN µF. VALUES 1 OR GREATER ARE IN pF UNLESS OTHERWISE NOTED.
3. ⬭ THIS SYMBOL INDICATES A POSITIVE DC VOLTAGE MEASUREMENT WITH NO SIGNAL BEING RECEIVED.
4. * THIS SYMBOL IS USED ON A PART THAT CHANGES VALUE DEPENDING ON THE FREQUENCY BAND IN YOUR RECEIVER. SEE THE CHART "ALTERNATE FREQUENCIES AND PARTS."
5. ALL VOLTAGES ARE MEASURED WITH A HIGH IMPEDANCE VOLTMETER, FROM THE POINT INDICATED TO COMMON GROUND. VOLTAGES MAY VARY ±20%.
6. REFER TO THE "STEP-BY-STEP ASSEMBLY" OR TO THE "CIRCUIT BOARD X-RAY VIEWS" FOR THE PHYSICAL LOCATION OF PARTS.







NECTING DIAGRAM

CUT ALONG DOTTED LINE

FOR PARTS REQUESTS ONLY

- Be sure to follow instructions carefully.
- Use a separate letter for all correspondence.
- Please allow 10 - 14 days for mail delivery time.

SEND TO:

HEATH COMPANY
BENTON HARBOR
MICHIGAN 49022
ATTN: PARTS REPLACEMENT

Phone (Replacement parts only):
616 982-3571

DO NOT WRITE IN THIS SPACE

INSTRUCTIONS

- Please print all information requested.
- Be sure you list the correct **HEATH** part number exactly as it appears in the parts list.
- If you wish to prepay your order, mail this card and your payment in an envelope. Be sure to include 10% (25¢ minimum, $3.50 maximum) for insurance, shipping and handling. Michigan residents add 4% tax.

Total enclosed $_____

- If you prefer COD shipment, check the COD box and mail this form. COD ☐

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

The information requested in the next two lines is not required when purchasing nonwarranty replacement parts, but it can help us provide you with better products in the future.

Model # _____ Invoice # _____

Date Purchased _____ Location Purchased _____

LIST **HEATH** PART NUMBER	QTY.	PRICE EACH	TOTAL PRICE
TOTAL FOR PARTS			
HANDLING AND SHIPPING			
MICHIGAN RESIDENTS ADD 4% TAX			
TOTAL AMOUNT OF ORDER			

THIS FORM IS FOR U.S. CUSTOMERS ONLY — OVERSEAS CUSTOMERS SEE YOUR DISTRIBUTOR

CUSTOMER SERVICE

REPLACEMENT PARTS

Please provide complete information when you request replacements from either the factory or Heath Electronic Centers. Be certain to include the **HEATH** part number exactly as it appears in the parts list.

Replacement parts are maintained specifically to repair Heath products. Parts sales for other reasons will be declined.

ORDERING FROM THE FACTORY

Print all of the information requested on the parts order form furnished with this product and mail it to Heath. For telephone orders (parts only) dial 616 982-3571. If you are unable to locate an order form, write us a letter or card including:

- Heath part number.
- Model number.
- Date of purchase.
- Location purchased or invoice number.
- Nature of the defect.
- Your payment or authorization for COD shipment of parts not covered by warranty.

Mail letters to: Heath Company
Benton Harbor
MI 49022
Attn: Parts Replacement

Retain original parts until you receive replacements. Parts that should be returned to the factory will be listed on your packing slip.

OBTAINING REPLACEMENTS FROM HEATH ELECTRONIC CENTERS

For your convenience, "over the counter" replacement parts are available from the Heath Electronic Centers listed in your catalog. Be sure to bring in the original part and purchase invoice when you request a warranty replacement from a Heath Electronic Center.

TECHNICAL CONSULTATION

Need help with your kit? — Self-Service? — Construction? — Operation? — Call or write for assistance. you'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
- The date of purchase.
- An exact description of the difficulty.
- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

Please do not send parts for testing, unless this is specifically requested by our Consultants.

Hints: Telephone traffic is lightest at midweek — please be sure your Manual and notes are on hand when you call.

Heathkit Electronic Center facilities are also available for telephone or "walk-in" personal assistance.

REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

If it is convenient, personally deliver your kit to a Heathkit Electronic Center. For warranty parts replacement, supply a copy of the invoice or sales slip.

If you prefer to ship your kit to the factory, attach a letter containing the following information directly to the unit:

- Your name and address.
- Date of purchase and invoice number.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit COD for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment. Do not include the kit Manual.) Place the equipment in a strong carton with at least THREE INCHES of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

HEATH

Schlumberger

www.manualsplus.com

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